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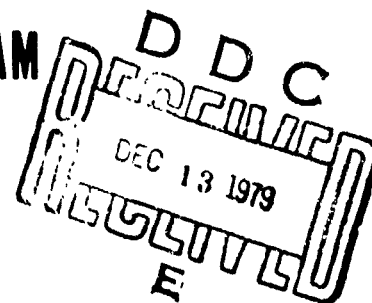
SEIP 006

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**STANDARD  
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TECHNICAL CONTROL FACILITY**

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**TECHNICAL CONTROL  
IMPROVEMENT PROGRAM  
(TCIP)**



1 OCTOBER 1979

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER SEIP 006	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Standard Engineering Installation Package, TECHNICAL CONTROL FACILITY, TECHNICAL CONTROL IMPROVEMENT PROGRAM (TCIP).		5. TYPE OF REPORT & PERIOD COVERED Final, Indefinite
6. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP Fort Huachuca, AZ 85613		8. CONTRACT OR GRANT NUMBER(s) (9) Final rept.
11. CONTROLLING OFFICE NAME AND ADDRESS	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS	12. REPORT DATE (11) 1 Oct 1979
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP Fort Huachuca, AZ 85613	15. SECURITY CLASS. (of this report) Unclassified	13. NUMBER OF PAGES
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release. Distribution unlimited. (12) 347		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) (14) USACEITA-SEIP-006		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Technical control, patch and test, quality control, site survey, communications engineering, narrowband, wideband, quality assurance. 405982 Gm		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This standard engineering installation package (SEIP) is prepared for projects which require overall standardization by communications-electronics commands in various parts of the world. It is used for guidance in preparing an engineering installation package (EIP) for a specific site, tailored to its unique requirements. This SEIP provides the guidance involved in selecting, acquiring, and installing equipment to update and improve technical control facilities worldwide. -- continued on reverse		

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20. Abstract--continued--It contains engineering analysis, site preparation information, and discusses the communications engineering plan. Equipment requirements for narrowband and wideband systems are discussed and detail engineering is extensively covered. The SEIP contains a list of applicable documents, suggests a checklist for site surveys, tells how to install and cutover equipment, reproduces typical engineering drawings, and gives a sample bill of materials. The SEIP also describes quality assurance plan, acceptance test plan and procedures, and the completion certification.

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No. 006

1 October 1979

Standard Engineering Installation Package  
TECHNICAL CONTROL IMPROVEMENT PROGRAM (TCIP)

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\*This regulation supersedes SEIP 006, 15 October 1976.

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## SECTION 1. GENERAL

1.1 PURPOSE AND SCOPE. The purpose of this standard engineering installation package (SEIP) is to provide detailed guidance for planning, engineering, installing, and testing of Communications-Electronics (C-E) facilities in accordance with US Army Communications Command (USACC) Supplement 1 to AR 105-6. This SEIP is applicable to all USACC engineering-installation activities involved in the planning and engineering of technical control facilities. It may be used by other Department of Defense activities and US Government agencies. RED/BLACK criteria have not been covered in this document. See MIL-HDBK-232 for details.

1.2 SYSTEM DESCRIPTION. The technical control facility is that element of a communications network with the necessary physical, electrical, and manpower capabilities to provide technical control, interface transmission elements of the system, and interface users with the system. The management of communications paths is accomplished at the primary technical control facility and subordinate technical control facilities. Lines of communications are derived from submarine and land cables, high frequency (HF), tropospheric scatter, line of site (LOS), and earth satellite radio transmission systems.

1.2.1 Technical control functions are technical direction, coordination, technical supervision of transmission media and equipment, quality control (QC), communications service restoral, and status reporting as defined in DCAC 310-50-3 and 310-55-1.

1.2.2 All technical control functions are accomplished with five basic operations: patching, coordination, testing, monitoring, and reporting.

1.3 TECHNICAL DESCRIPTION. The technical discussion in this section will be presented in two parts. Paragraph 1.4 will address the narrowband requirements at the channel level, and paragraph 1.5 will discuss the wideband requirements at the group, supergroup, and baseband levels.

### 1.4 NARROWBAND EQUIPMENT REQUIREMENTS.

1.4.1 General. The technical control facility/patch test facility (PTF) will be configured and engineered to enable the technical controller to use the full capabilities of the equipment and personnel resources through the efficient performance of the daily functions of coordination, technical direction, technical supervision, restoral, and status reporting. Consideration shall be given in the design of

an upgrade or new installation to those goals given in NCAC 310-50-3 and sections 4 and 5 of MIL-STD-188-310.

#### 1.4.2 Equipment description.

1.4.2.1 Voice frequency primary patch bay. The primary patch bay, USACEEIA Specification, CCC-75046, consists of the equipment rack, primary patch panels, interbay trunk patch panels, and a miscellaneous patch panel. This bay may be configured to provide patch appearances for up to 72 8-wire, 96 4-wire or 6-wire, or 192 2-wire circuits. The voice frequency (vf) primary patch bay will be configured as shown in figure 1-1. It contains up to eight audio patch panels, one interbay patch panel, one miscellaneous patch panel, blank panels, and a writing shelf.

1.4.2.1.1 Equipment rack. The equipment rack, USACEEIA Specification, CCC-75050, contains cable ladders, modified bottom or top panel (signal cable feed through), ac outlet strip, and utility outlets. Also included with the rack will be a hinged rear door, two side panels when installed alone or one side panel if installed at the end of a row of equipment. The rack will accept standard 19-inch equipment panels in accordance with MIL-STD-189. This rack will be used for all patch bays.

1.4.2.1.2 Voice frequency patch panel. Each vf patch panel contains 24 jack sets. Each set contains four jacks and are labeled: line, equipment, line monitor, and equipment monitor. Figure 1-2 shows the physical layout of the patch panel and figure 1-3 is the schematic. This panel, USACEEIA Specification, CCC-75047, can be used for 2-wire, 4-wire 6-wire, or 8-wire circuits. When used as a 2-wire panel, each jack set becomes a transceiver circuit. When used as a 4-wire panel, one panel (upper) is marked SEND and one panel (lower) is marked RECEIVE. Therefore, a jack is only one-half of a 4-wire circuit. For 6-wire operation, the sleeve lead is used for earth and metallic (E&M) lead signaling. In special cases, an 8-wire circuit may be required; this is accomplished by adding a pilot make busy (PMB) echo suppressor control (ESC) panel between a SEND and RECEIVE panel. When 8-wire vf circuits are required, only six vf panels with three PMB/ESC panels are used or a total of 72 8-wire circuits.

1.4.2.1.3 Interbay panel. The interbay panel, USACEEIA Specification, CCC-75048, is used to convey the signal from one bay to another bay. This function is required for alternate routing and for test and monitor purposes. The interbay panel contains 48 jack sets, each set independently operated. Physical layout of an interbay panel is shown in figure 1-4 and a schematic is shown in figure 1-5. A typical interbay cabling scheme is shown in section 4.

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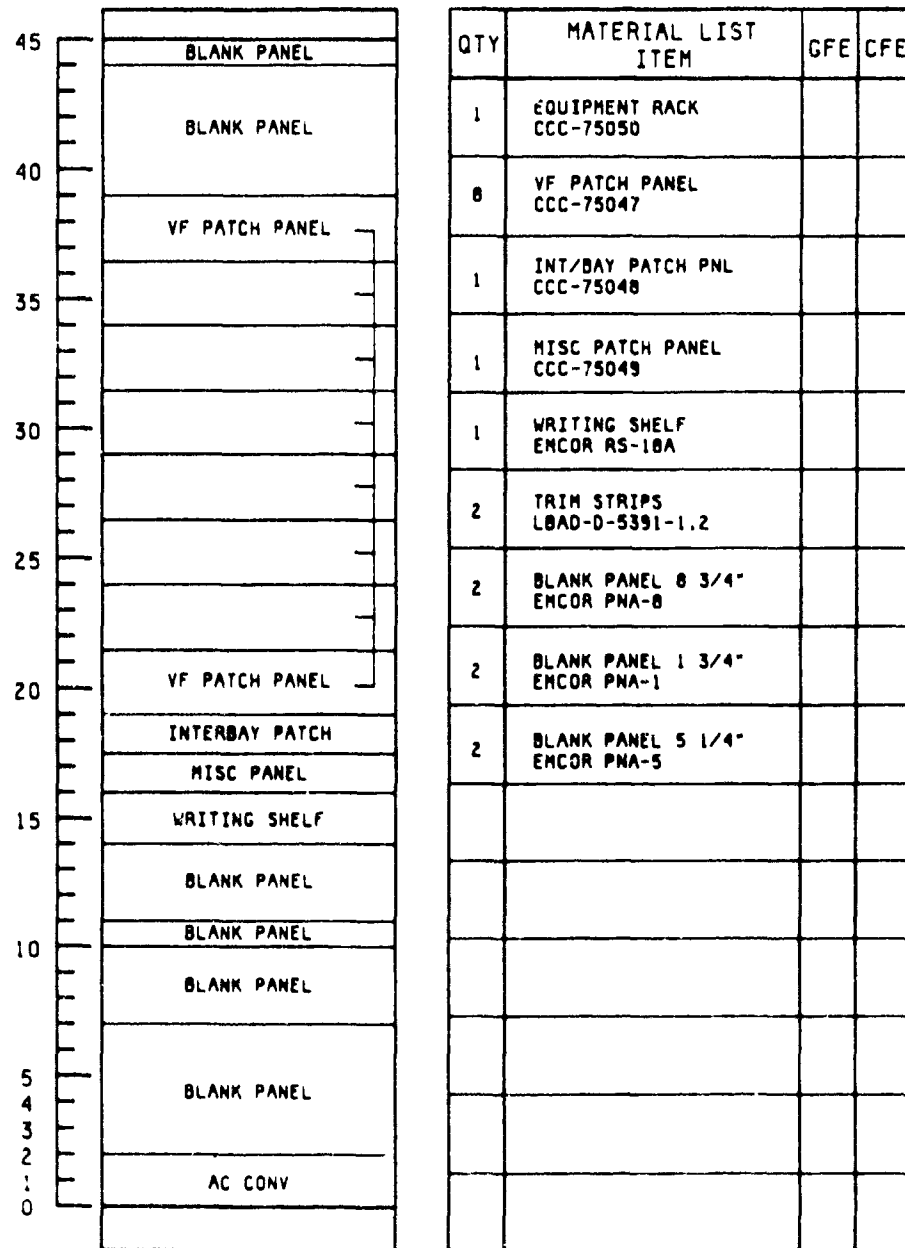


Figure 1-1. 2-, 4-, 6-wire primary equal level vf patch bay, USACEIA Specification CCC-75046.

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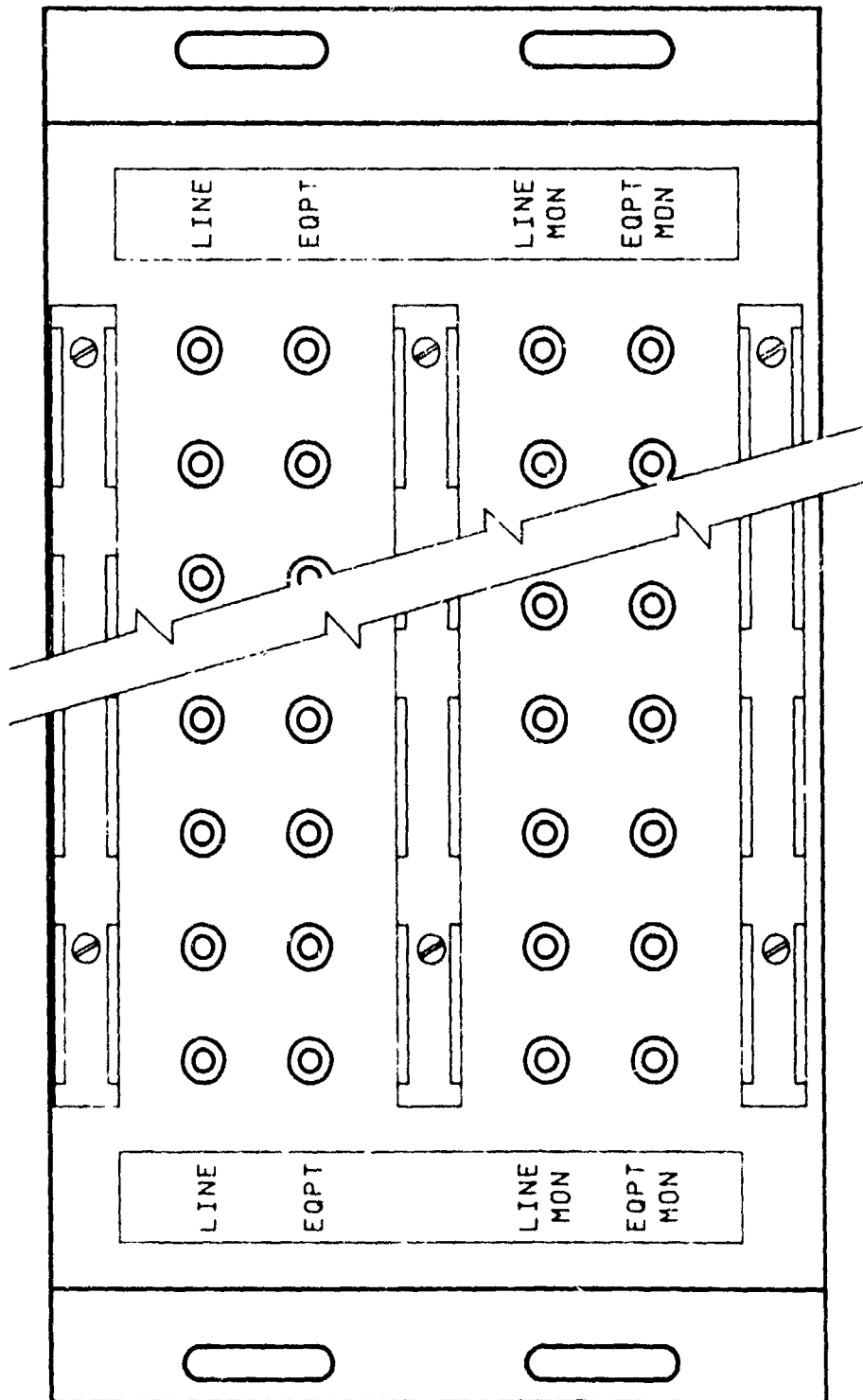


Figure 1-2. 2-Wire audio patch panel, USACEEIA Specification CCC-75047.

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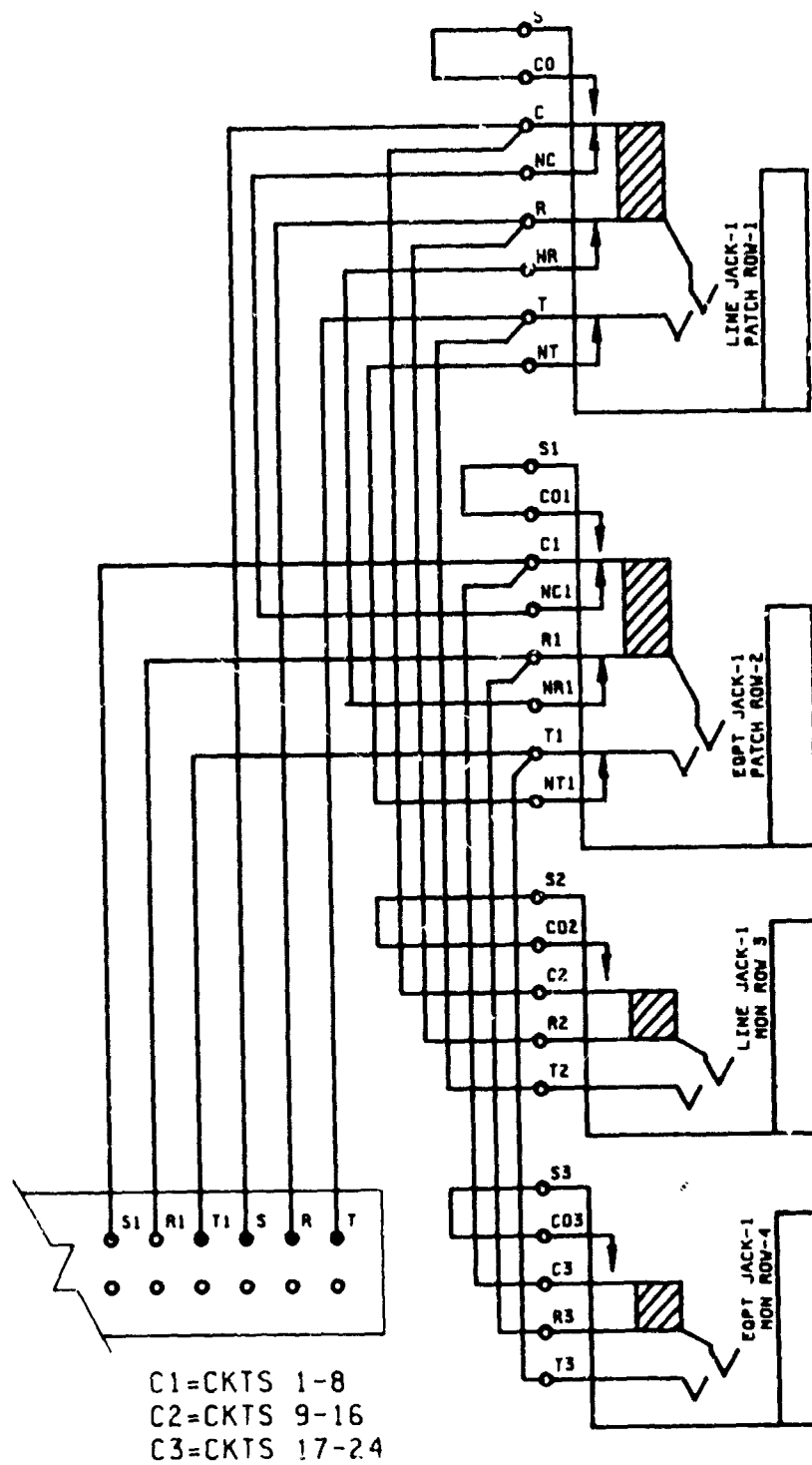


Figure 1-3. Audio panel schematic, USACEEIA Specification CCC-75047.



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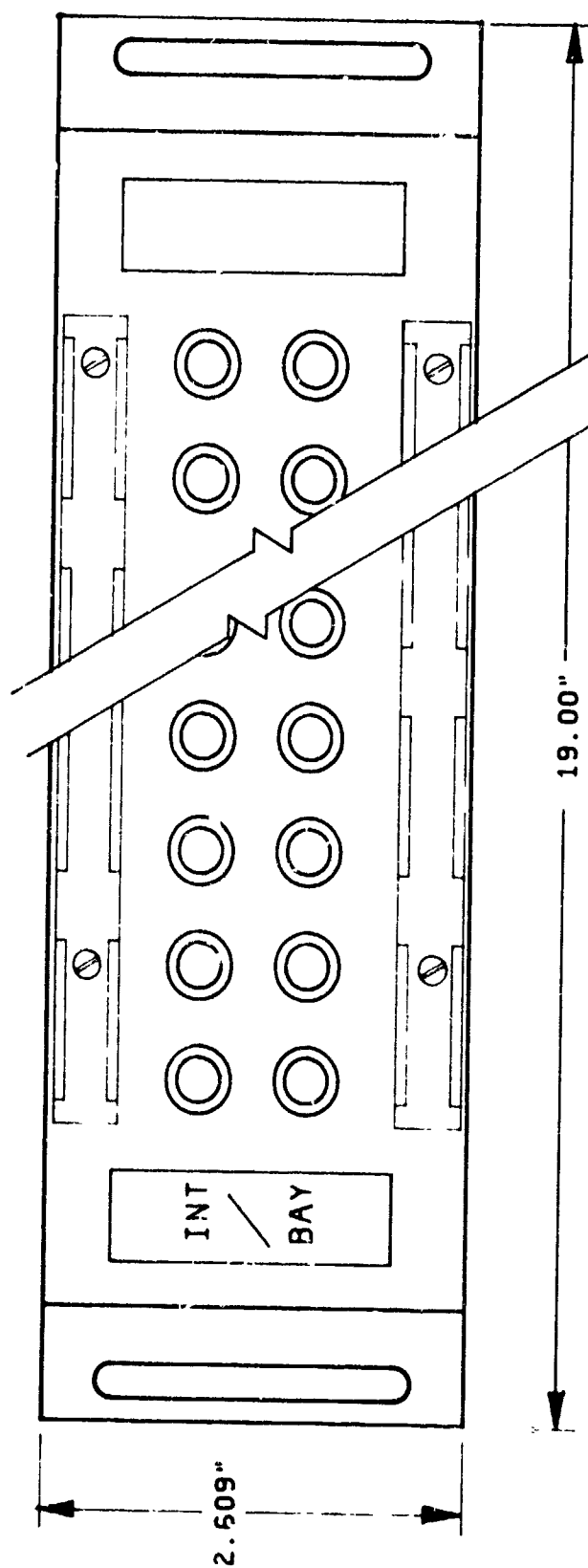


Figure 1-4. Interbay panel jack layout, USACEEIA Specification CCC-75048.

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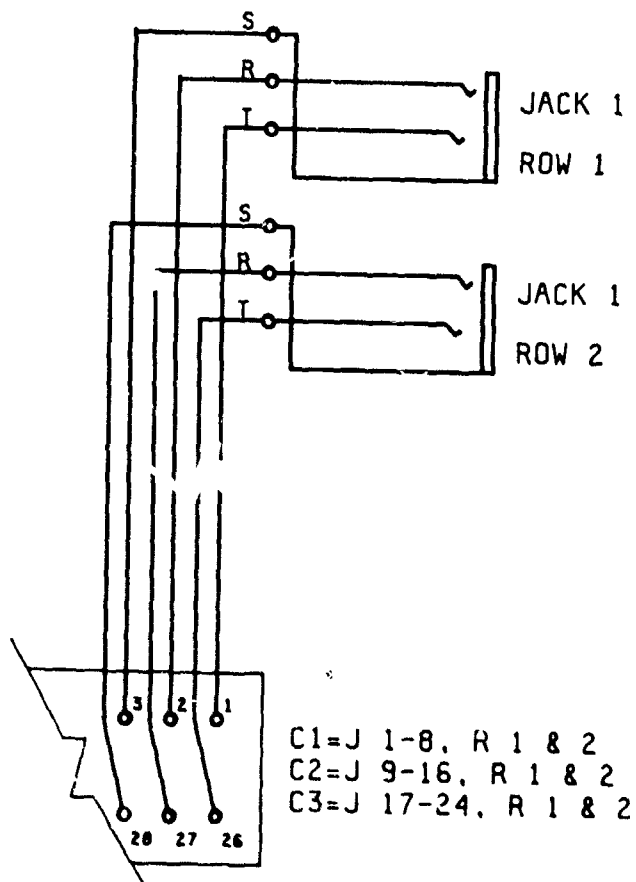


Figure 1-5. Interbay panel schematic diagram.

1.4.2.1.4 Miscellaneous patch panel. The miscellaneous patch panel is used to access test equipment, speaker panels, special jack arrangements, and bridge modules. USACEEIA Specification, CCC-75049, provides a miscellaneous patch panel that allows bridge idle leg-load resistors and jack strapping to be accomplished on the back of the panel in addition to the miscellaneous jacks appearing on the cross connect frame. The panel layout is shown in figure 1-6 and the schematic is shown in figure 1-7. The last ten jacks in row 2 are associated with a lamp jack in row 1; this allows circuit in-use identification and can be multiple strapped to associated jacks in other bays.

1.4.2.1.5 Work or writing shelf. A work or writing shelf is required in all test bays but may also be installed in patch bays as well. In positioning the shelf, consideration should be given to the space required above for equipment and/or patch panels and to comfort in its use. A suggested position is bay space 15 and 16. This puts the surface at 33 inches from the floor.

1.4.2.1.6 Blank panels. The remainder of the bay space is filled with blank panels. The blank panels at the top of the bay may be omitted when test equipment is to be installed.

1.4.2.1.7 Patch cord. Patch cords will be furnished as follows: Fifty cords will be furnished with one vf patch bay, 75 with two bays, and 100 with three or more bays. The cord furnished will be 6 feet long, ADC PJ-86 (NSN 5995-00-246-9792).

1.4.2.2 Direct current primary patch bay. The dc patch bay, USACEEIA Specification, CCC-75057, contains the equipment rack (see 1.4.2.1.1), high level patch panels, 48 interbay trunks with circuit-in-use indicating lamps, and a miscellaneous panel. This bay may be configured to provide patch appearances for up to 72 full duplex exchange (FDX) circuits. The dc primary patch bay will be configured as shown in figure 1-8. This bay may contain up to six dc patch panels, one 48-lamp interbay panel, and one miscellaneous panel. This configuration will provide 72 FDX teletypewriter (TTY) circuits, 48 interbay circuits with circuit-in-use indicating lamps, and a miscellaneous patch panel.

1.4.2.2.1 Direct current primary patch panel. The primary dc high level patch panel, USACEEIA Specification, CCC-75060, is shown in figure 1-9. The transmission and receive panel are identical in appearance, but are wired differently. The schematic for the transmission panel is shown in figure 1-10 and the schematic for the receive panel is shown in figure 1-11. This panel contains jack sets for 24 high level dc TTY or data circuits. Each jack set contains four jacks in a vertical row and are labeled: line, equipment, line

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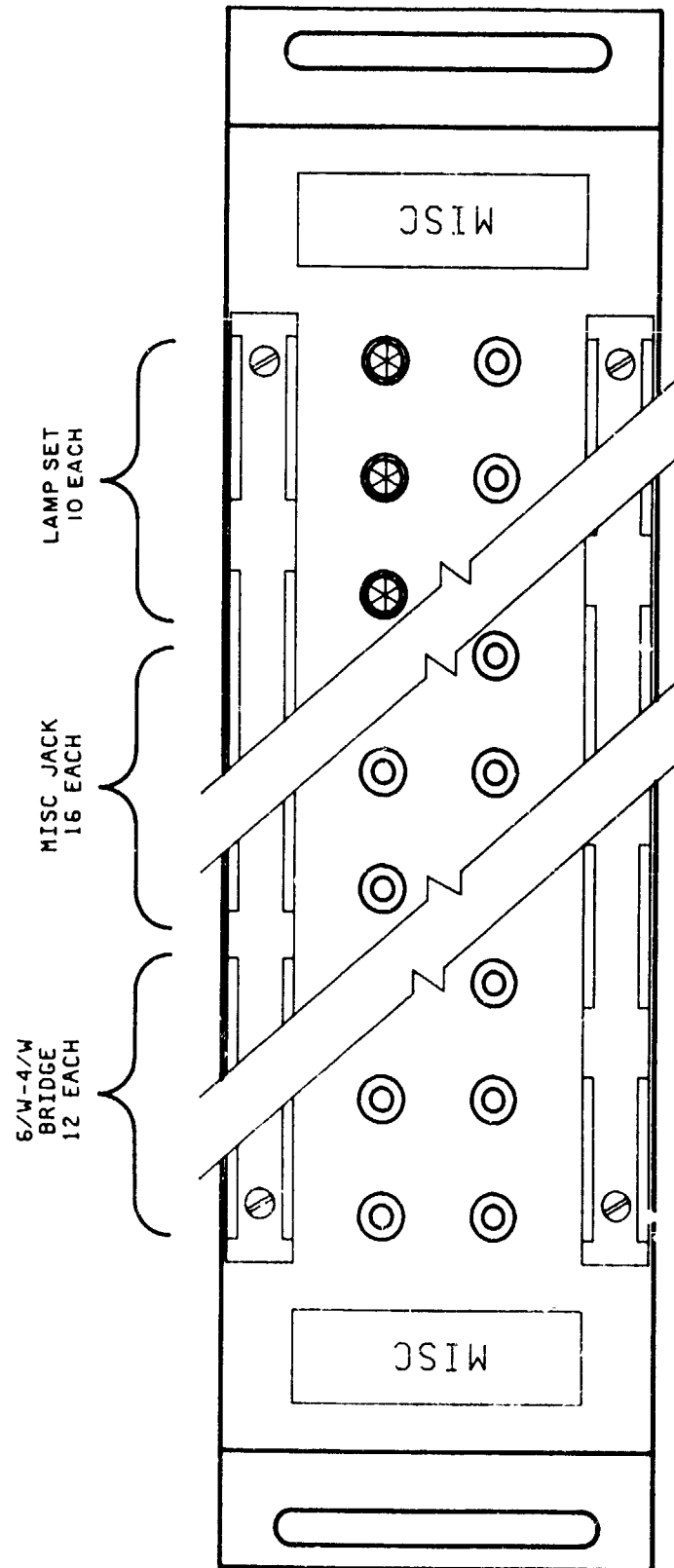


Figure 1-6. Miscellaneous patch panel layout, USACEIA Specification CCC-75049.



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45 40 35 30 25 20 15 10 5 4 3 2 1 0	MATERIAL LIST ITEM	GFE	CFE
45	BLANK PANEL		
	BLANK PANEL		
40	BLANK PANEL		
	DC HL XMT PANEL CCL 75060		
35	DC HL RCV PANEL CCL-75060		
	48 LAMP INTERBAY PANEL CCC-75052		
30	MISC PATCH PANEL CCC-75049		
	WRITING SHELF EMCOR RS-18A		
25	TRIM STRIP LBAD-D-5391-9.13		
	BLANK PANEL 8 3/4" EMCOR PNA-8		
20	BLANK PANEL 7" EMCOR PNA-7		
	BLANK PANEL 1 3/4" EMCOR PNA-1		
15	BLANK PANEL 5 1/4" EMCOR PNA-5		
10			
5			
4			
3			
2			
1			
0			

Figure 1-8. Dc patch bay high level,  
USACEEIA Specification CCC-75057

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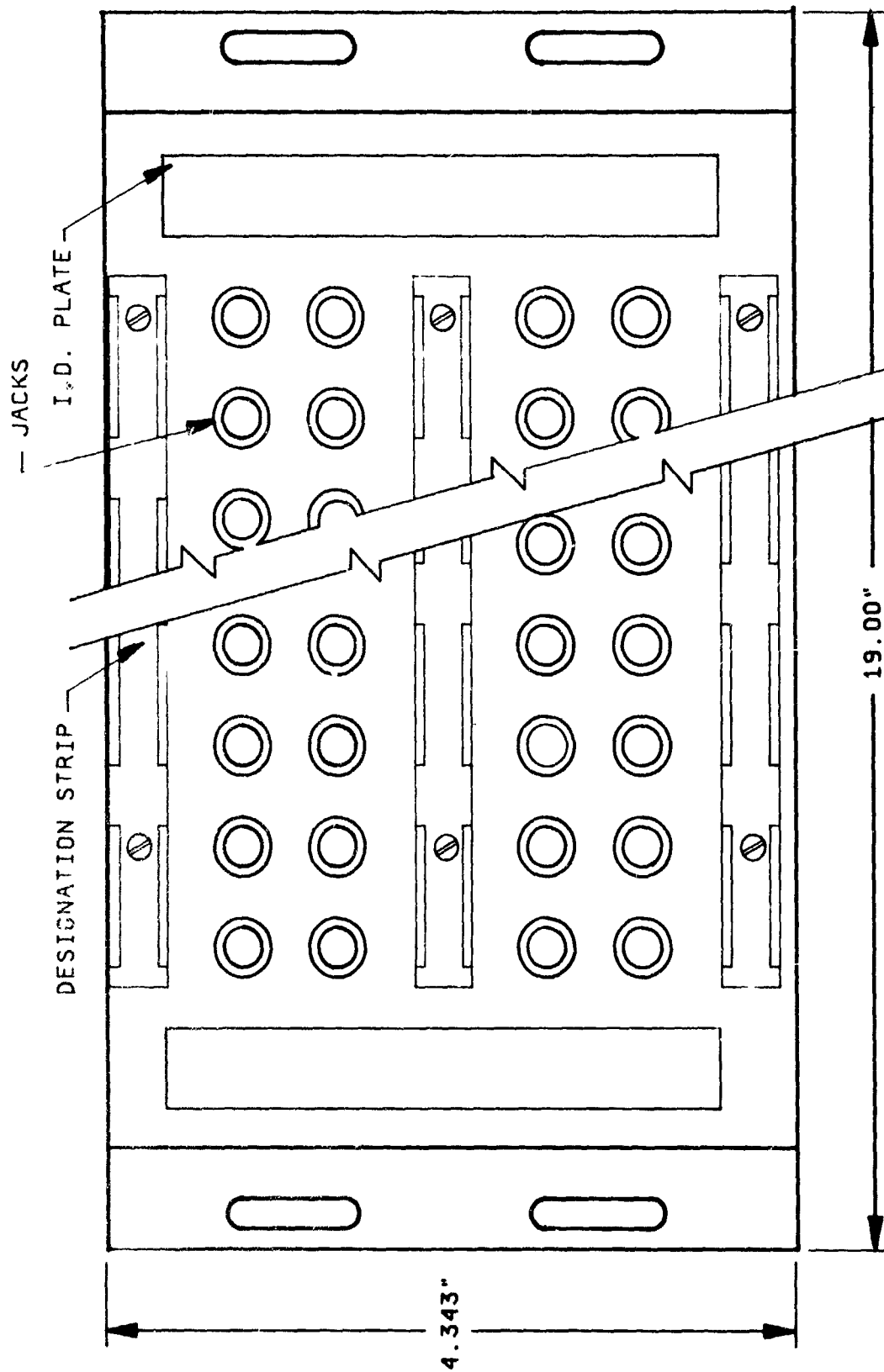


Figure 1-9. Dc high level patch panel, USACEEIA Specification CCC-75060.

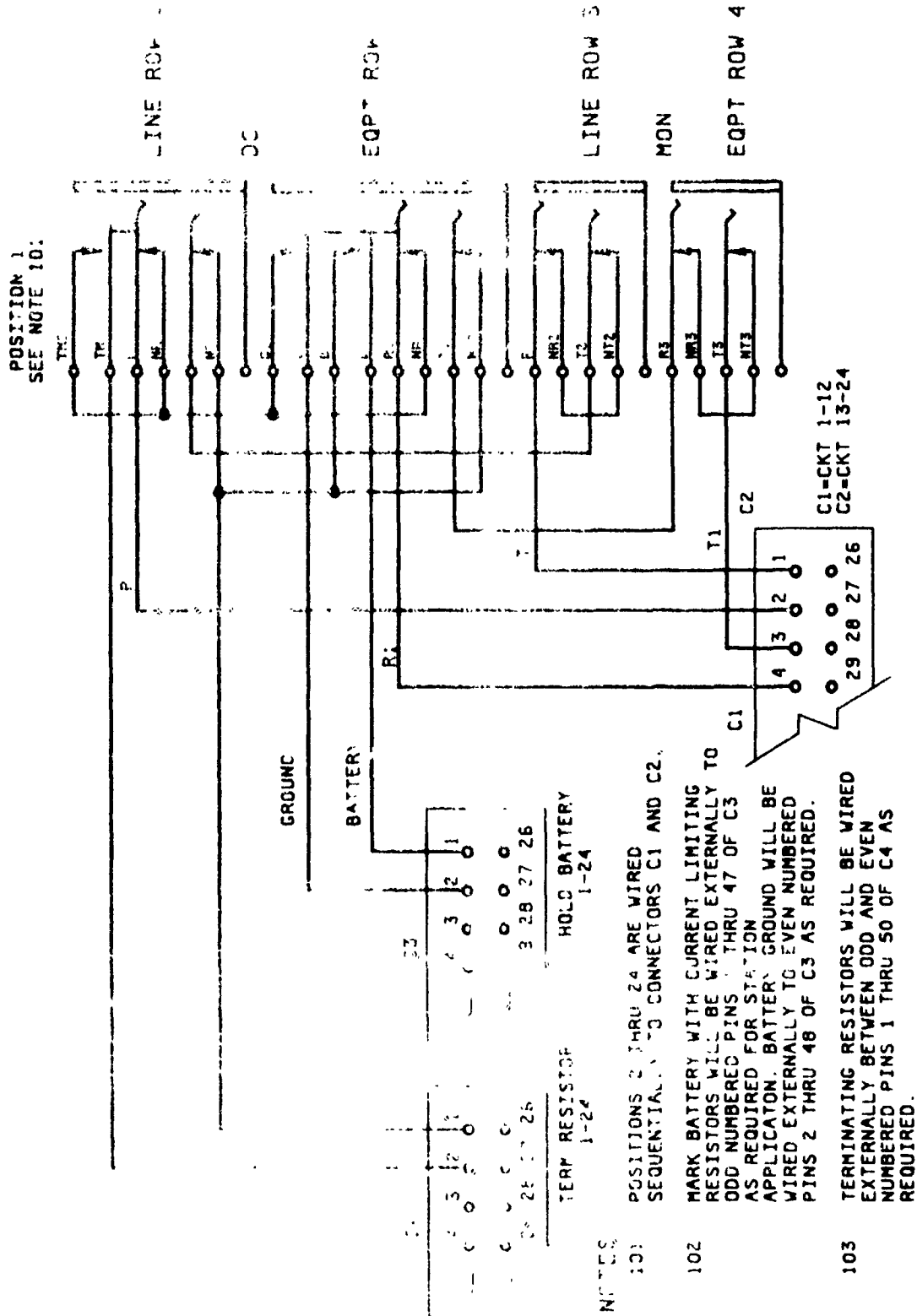
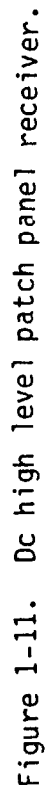


Figure 1-10. Dc high level patch panel transmitter.





monitor, and equipment monitor. The tip and ring contacts of the jacks are wired to connector C1 and C2 on the back of the panel frame and the hold battery is wired to C3. Grounds or terminating resistors are wired to C4. As can be seen by the schematic, the hold battery and grounds are applied to the sync by inserting a patch plug in the source jack. This eliminates the grounding of the return signal leads at the distributing frame, eliminating a noise source.

1.4.2.2.2 Interbay patch panel (48-lamp). The USACEEIA Specification, CCC-75052, interbay panel used in the dc patch area contains 48 lamps and 48 jack sets. The panel layout is shown in figure 1-12. Each jack has an associated lamp. The lamp indicates when a jack circuit is in use. A schematic is shown in figure 1-13. Interbay wiring scheme can be either express or party line or a combination of both. In the express scheme, the number of bays to be interbay wired will be divided into 48 (number of jacks on an interbay panel) and the answer derived is the number of jacks that can be express wired to each bay saving an equal number for miscellaneous use. While this system has the advantage of private use in interbay circuits, its disadvantage is that the number of circuits between bays is limited. In the party line scheme, all 48 jack circuits are wired to all dc bays. Since the lamp indicates circuit-in-use, this is the preferred system. The advantage is that there are more interbay circuits available at each bay. This is especially useful when a voice frequency carrier terminal (VFCT) must be substituted, and 16 circuits SEND and 16 circuits RECEIVE require rerouting. The interbay wiring scheme could be a combination of both express and party line. A number of jacks could be used as express and the remainder as party line. When determining the type scheme to use, consideration should be given to the requirements of the station and site personnel preference. Typical dc interbay wiring is shown in section 4.

1.4.2.2.3 Miscellaneous patch panel. Miscellaneous patch panels are used in the dc patch area for the same purpose as in the vf area. USACEEIA Specification, CCC-75049, figures 1-6 and 1-7, satisfies the requirements of the dc area in that 10 jack and lamp circuits are available for data orderwire, regenerative repeaters, and TTY monitors. Typical wiring schemes for dc miscellaneous panels are shown in section 4.

1.4.2.2.4 Work or writing shelf. The writing shelf in the dc area functions the same as in the vf area. For suggestion mounting, see paragraph 1.4.2.1.5.

1.4.2.2.5 Blank panels. The suggested sizes of blank panels are shown in figure 1-8.

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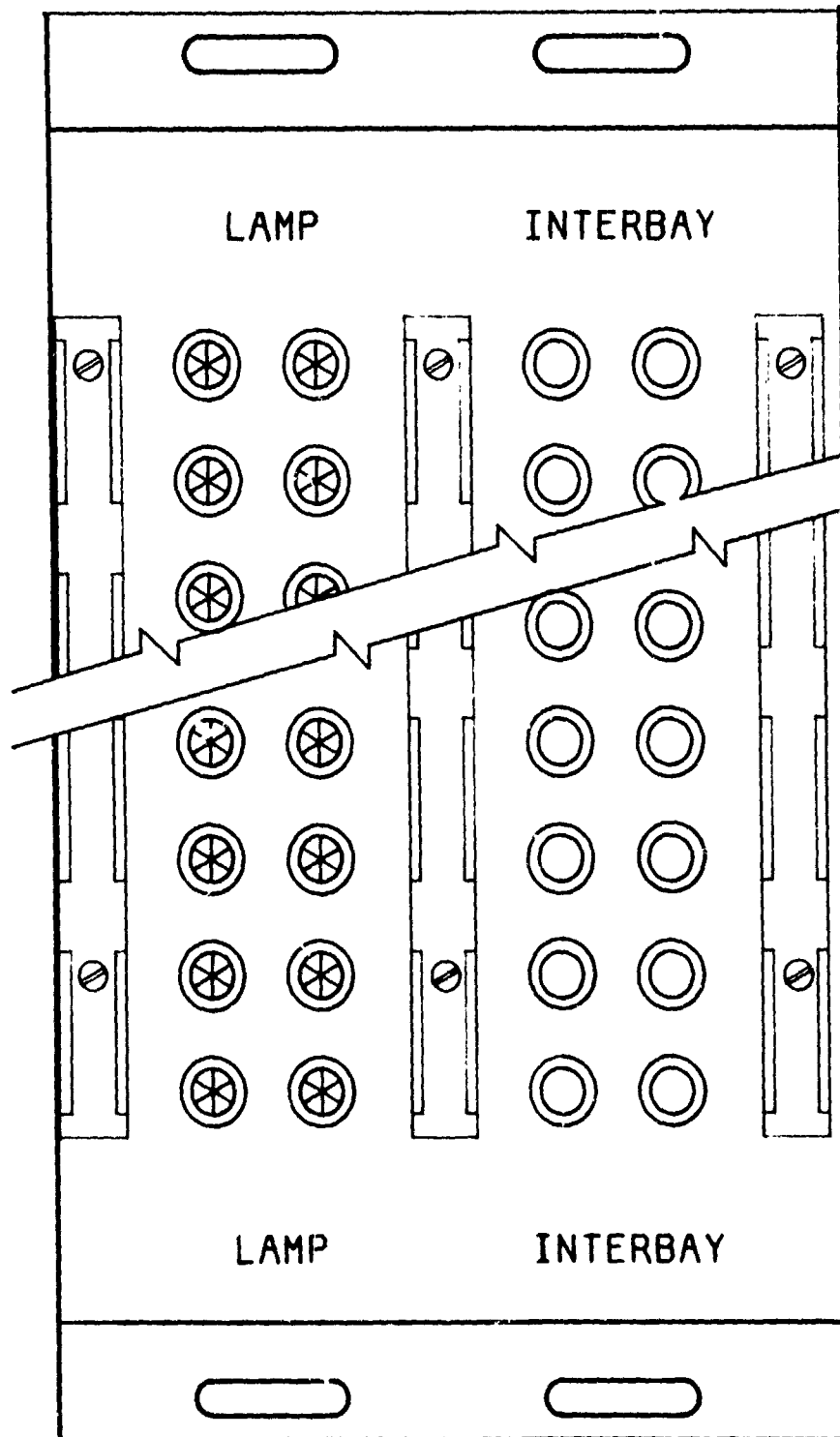


Figure 1-12. 48-Lamp interbay panel layout, USACEEIA Specification CCC-75052.

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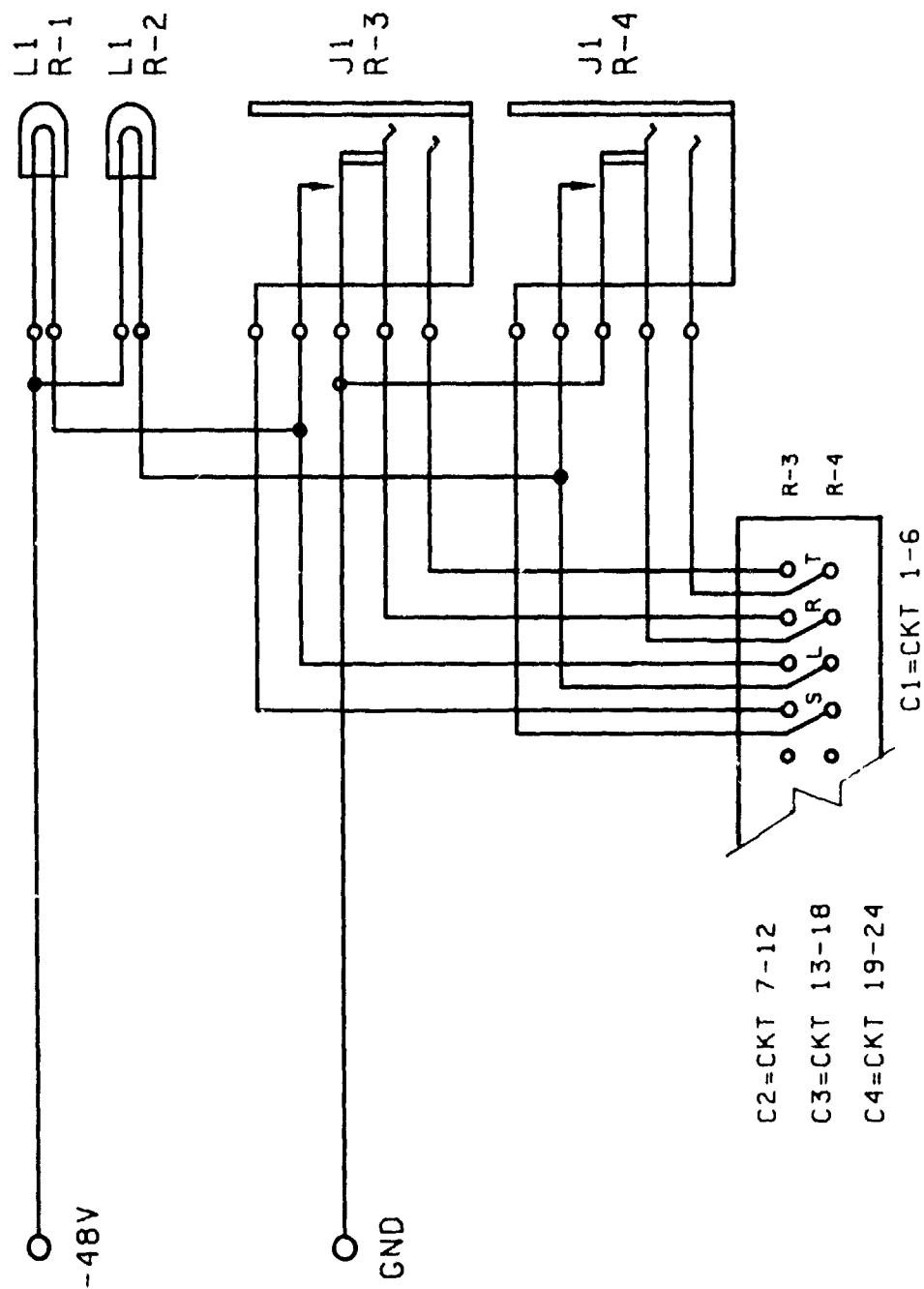


Figure 1-13. 48 lamp interbay panel schematic.

1.4.2.2.6 Patch cord. Patch cords will be furnished in the following quantities: seventy cords with 1 dc patch bay, 100 cords with 2 dc patch bays, and 125 cords with 3 or more dc patch bays. The cord to be furnished will be 6 feet long, ADC PJ-86 (NSN 5995-00-246-9792).

1.4.2.3 Equal level patch bay. The equal level patch bay, USACEEIA Specification, CCC-75046, is configured the same as the primary patch bay (fig. 1-1). This bay provides the appearance of 96 4-wire circuits with interbay and miscellaneous trunks. The signals transversing the equal level patch bay are 0 dBm send and 0 dBm receive. This equal level signal makes this bay the point where circuits can easily be cross patched. Cross patching is performed without signal adjustment devices. For discussion on the patch panels, writing shelf, blank panels, and patch cord, see paragraph 1.4.2.1.

1.4.2.4 Direct current low level circuit patch bay. The low level dc patch bay USACEEIA Specification, CCC-75057, serves as a point of alternate routing and testing for the dc circuits traversing the technical control facility. This bay will also be used as the interface between the low level subscriber and the VFCT or other digital processing equipment eliminating the appearance of low level circuits from the primary dc patch bay that do not require converting or isolating. This bay provides dc 2-wire patch panels for 72 FDX low level circuits, 48 interbay trunks with lamps, and a miscellaneous patch panel. The low level circuit patch bay can be configured as shown in figure 1-14 which contains dc low level patch panels, interbay and miscellaneous trunks for up to 72 FDX low level dc circuits, or 36 FDX high-speed circuits with timing. In a technical and engineering panel meeting consisting of Defense Communications Engineering Command (DCEC) and the triservices, an agreement has been reached separating balanced and unbalanced digital circuits at the low level circuit patch position. The two designations are K (kilo/bit) patch for the balanced circuits and D (digital) patch for the unbalanced circuits. In facilities requiring both types of patch appearances, an unbalanced/balanced converter will be installed between the D and the K patch. This will make the K patch the common bay where all circuits appear and a convenient point for rerouting. The locations of these patch positions are shown in figure 1-14.

1.4.2.4.1 Dual function low level patch panel. The patch panel as used in low level patch bay, USACEEIA Specification, CCC-75058, can be used for balanced medium-speed or unbalanced low-speed dc circuits. Two panels are required for either operation: one send panel and one receive panel. Figure 1-15 shows the layout of this panel. When used as a balanced medium-speed panel, the odd number jacks are data circuits and the even numbered jacks are for timing. Therefore, only 12 circuits per panel are possible. The spacing between the jack sets prevents patching the wrong data with the timing. A dual

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45 40 35 30 25 20 15 10 5 4 3 2 1	MATERIAL LIST ITEM	GFE	CFE
45	BLANK PANEL		
40	BLANK PANEL		
35	BLANK PANEL		
30	DC LL XMT PANEL DC LL RCV PANEL DC LL XMT PANEL DC LL RCV PANEL DC LL XMT PANEL DC LL RCV PANEL DC LL XMT PANEL DC LL RCV PANEL		
25	DC LL XMT PANEL DC LL RCV PANEL		
20	INTERBAY PATCH PANEL MISC PANEL		
15	WRITING SHELF BLANK PANEL BLANK PANEL BLANK PANEL BLANK PANEL		
10			
5			
4			
3			
2			
1			

Figure 1-14. Dc patch bay low level,  
USACEIA Specification CCC-75057.

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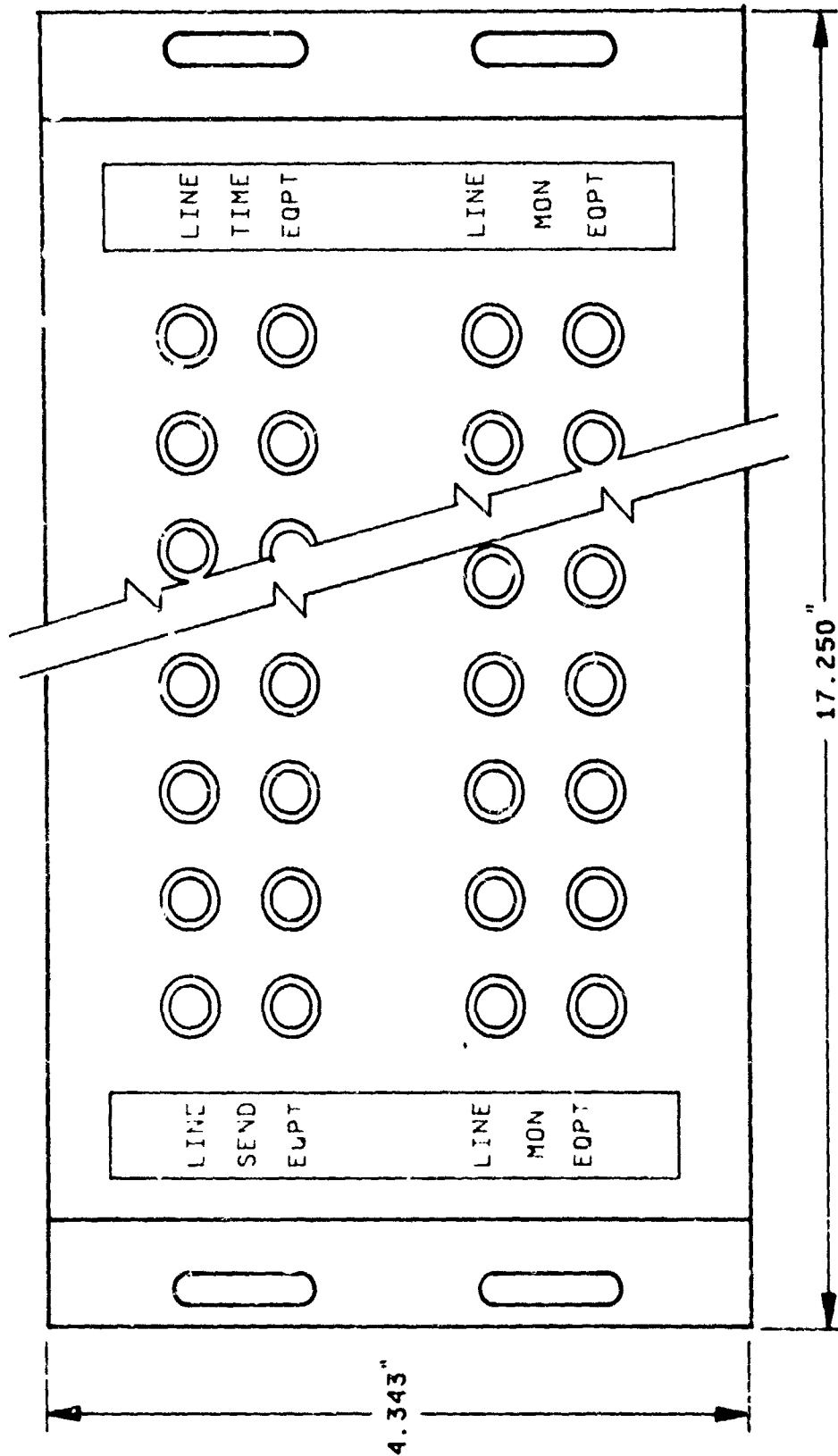


Figure 1-15. Patch panel, dc low level, USACEEIA Specification  
CCC-75058.

plug is required for use with balanced operation. Figure 1-16 is the receive schematic, and figure 1-17 is the send schematic. It can be seen by the schematic that both the data and timing circuits are identical except for marking. Using all jack circuits for data, this identical jack wiring allows for balanced application. Again, the difference is the marking of the panels and jack. In applications where cut-key function is required, a dummy plug is used. The plug is used in line for the receive panel and equipment side for the send panel. As can be seen by the schematic, when a dummy plug or patch cord is inserted in the source jack as discussed above, hold battery is applied to one side of the sync line and a terminating resistor in the other side. This operation is true for timing sync and data sync respectively in balanced panels. The interbay panel and the miscellaneous panel functions the same as discussed in paragraphs 1.4.2.2.2 and 1.4.2.2.3.

1.4.2.4.2 Multicircuit patch panel. The multicircuit patch panel is used in circuits that require patching or alternate routing of multi-conductors. The recommended panel is the Dyna-Patch by Cooke Engineering Company, 153-004-(16), (see fig. 1-18). An equal substitute may be used. The panel contains up to 16 patching modules with monitor. Twelve separate conductors may be monitored by patching from the appropriate monitor jack associated with the respective circuits to the special monitor jack associated with the 12 circuits, then brought out to the 12 tip-type monitor points where they can be tested separately. The patch module prescribed for use in the above panel is the Cooke Engineering Company, DP-12-2, described in figure 1-19. An equal substitute may be used as well. The Dyna-Patch jack may be used to monitor online circuits without interruption of normal through. This receptacle is permanently bridged across the line side so that monitoring or testing may be accomplished even if patch cords are inserted in both the line and equipment receptacles.

1.4.2.5 Universal line conditioning equipment. The line conditioning equipment (LCE) will be configured into strings as required by figure 1 of MIL-STD-188-310 and will be electrically connected between the primary patch bay and the equal level patch bay. The LCE is rack mounted in a 19-inch rack containing 10 shelves as shown in figure 1-20, sheet 1. Each shelf contains module spacing for 12 universal modules. This type of configuration meets the requirement of MIL-STD-188-310 in that modules can be configured into the string concept illustrated. The universal module system has the advantage of limited module-type substitution without the need to recross/connect. For example, an EM/20-Hz converter can be removed and an EM/dc converter installed without the need for cross connection, or a 2600-Hz single frequency signaling unit (SFSU) may be removed and a 1600-Hz SFSU installed. Substitution is made possible by the module inputs and outputs having the same pin number and the wiring scheme



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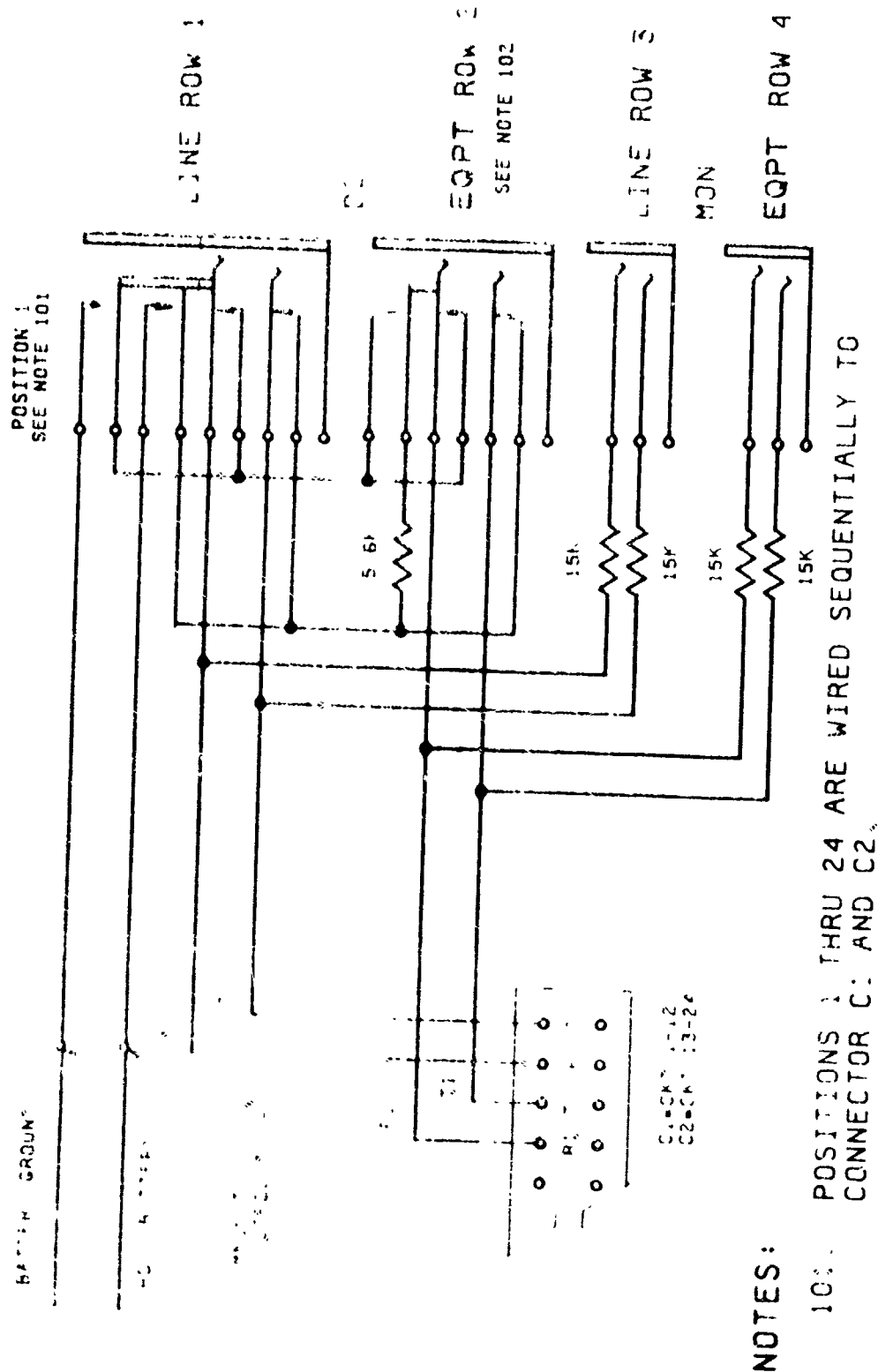


Figure 1-16. Receive patch panel schematic.

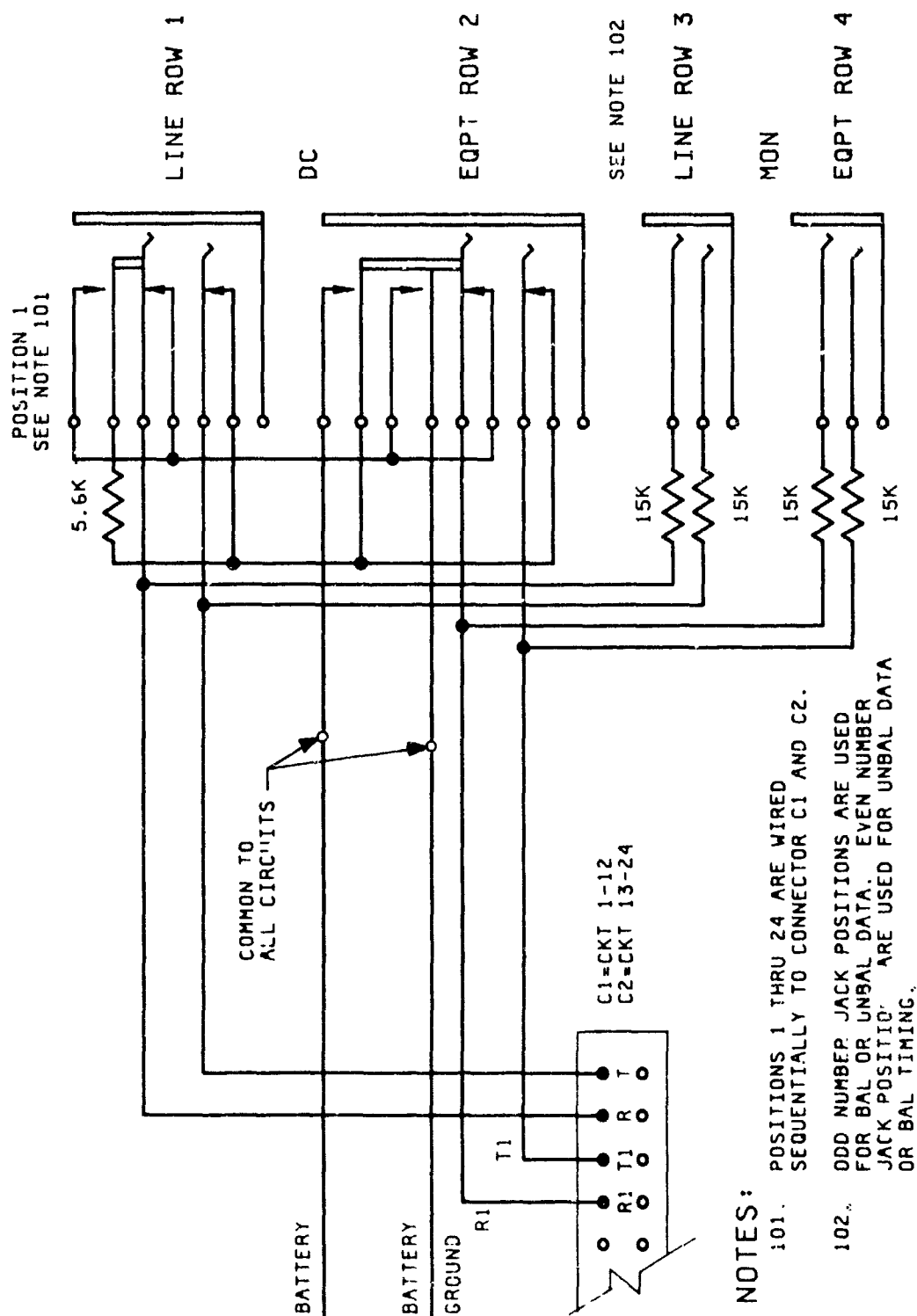


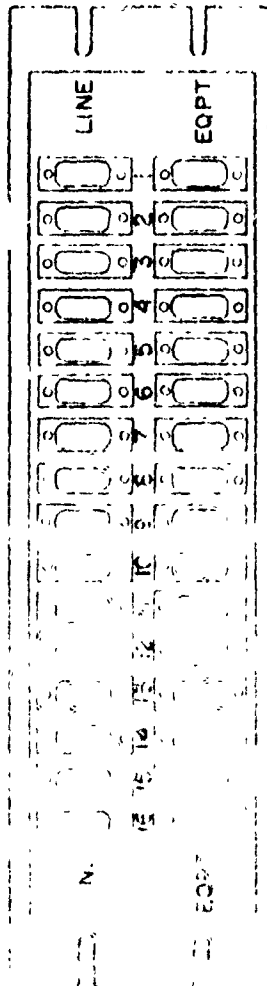
Figure 1-17. Send patch panel schematic.

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DESCRIPTION THE 153 004A-(16) E I A  
DATA PATCH MODULE CONSISTS OF THE  
FOLLOWING

- 1 NONFERROUS METAL ENCLOSURE  
5 1/4 INCHES HIGH BY 19 INCHES  
WIDE BY 6 INCHES DEEP
- 2 REMOVABLE COVERS ON TOP AND  
BOTTOM OF ENCLOSURE FOR  
ACCESS TO INTERNAL WIRING
- 3 COMPLETE WITH SEPARATE TEST  
MONITOR POSITION THAT INCLUDES  
4 1/2 CIRCUIT MONITOR INPUT JACK  
DP-12-3 WIRE TO 12 TIP-TYPE  
TEST POINTS AND A STANDARD 2  
PIN E I A CONNECTOR
- 4 SIXTEEN (16) EACH DP-12-2, 12  
CIRCUIT SELF-NORMALLING  
PATCHING JACKS WITH MONITOR  
POSITION
- 5 THIRTY-TWO (32) STANDARD,  
TWENTY-FIVE PIN E I E CONN-  
ECTORS ON THE REAR OF THE  
ENCLOSURE
- 6 EACH JACK POSITION IS WIRED TO  
AN INPUT AND OUTPUT E I A CON-  
NECTOR IN ACCORDANCE WITH  
CUSTOMER SPECIFICATIONS
- 7 IDENTIFICATION STRIP TOP AND  
BOTTOM ARE INCLUDED ON FRONT  
PANELS



P E R VIEW

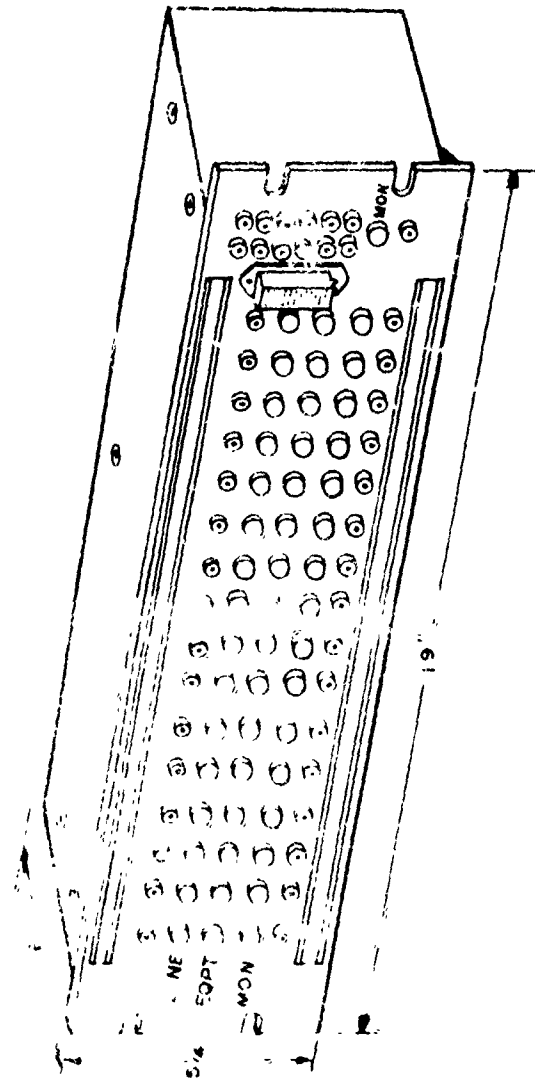


Figure 1-18. Multicircuit patch panel layout.

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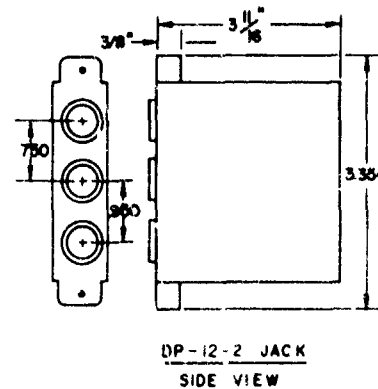
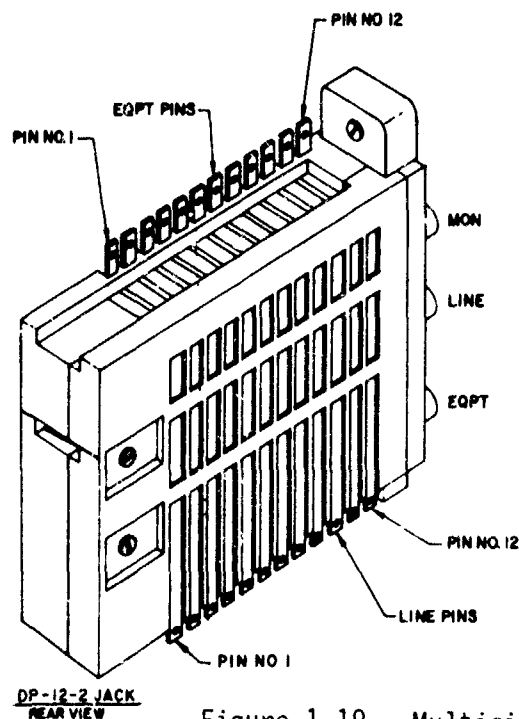
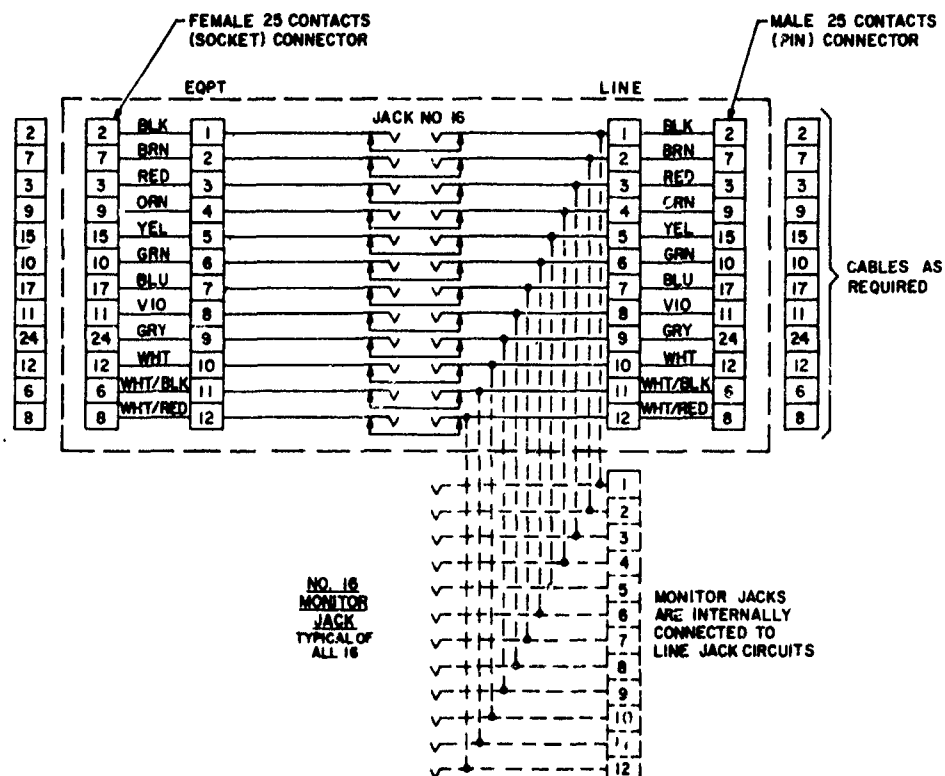


Figure 1-19. Multicircuit patch module.

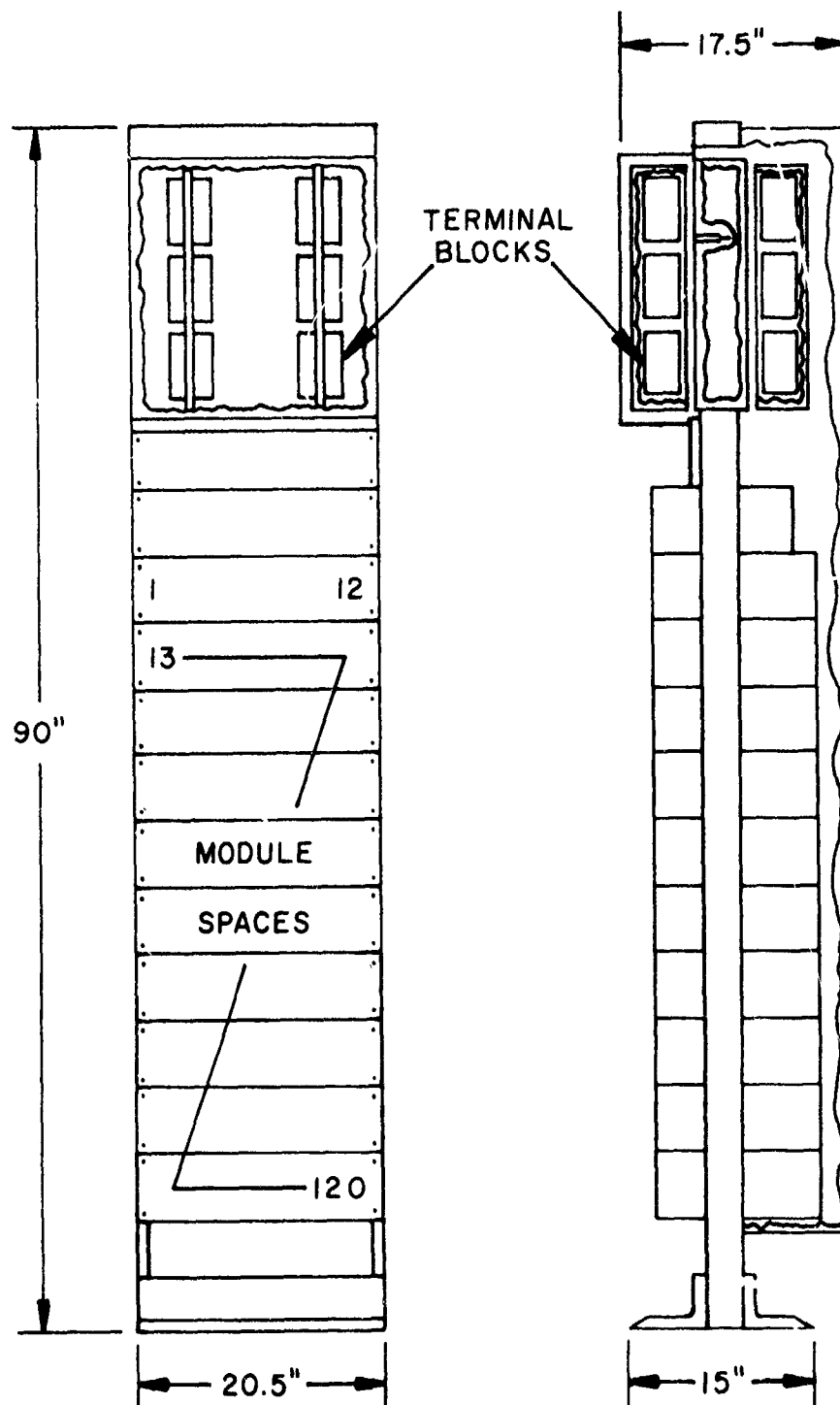


Figure 1-20. Universal conditioning equipment bay (sheet 1 of 2).

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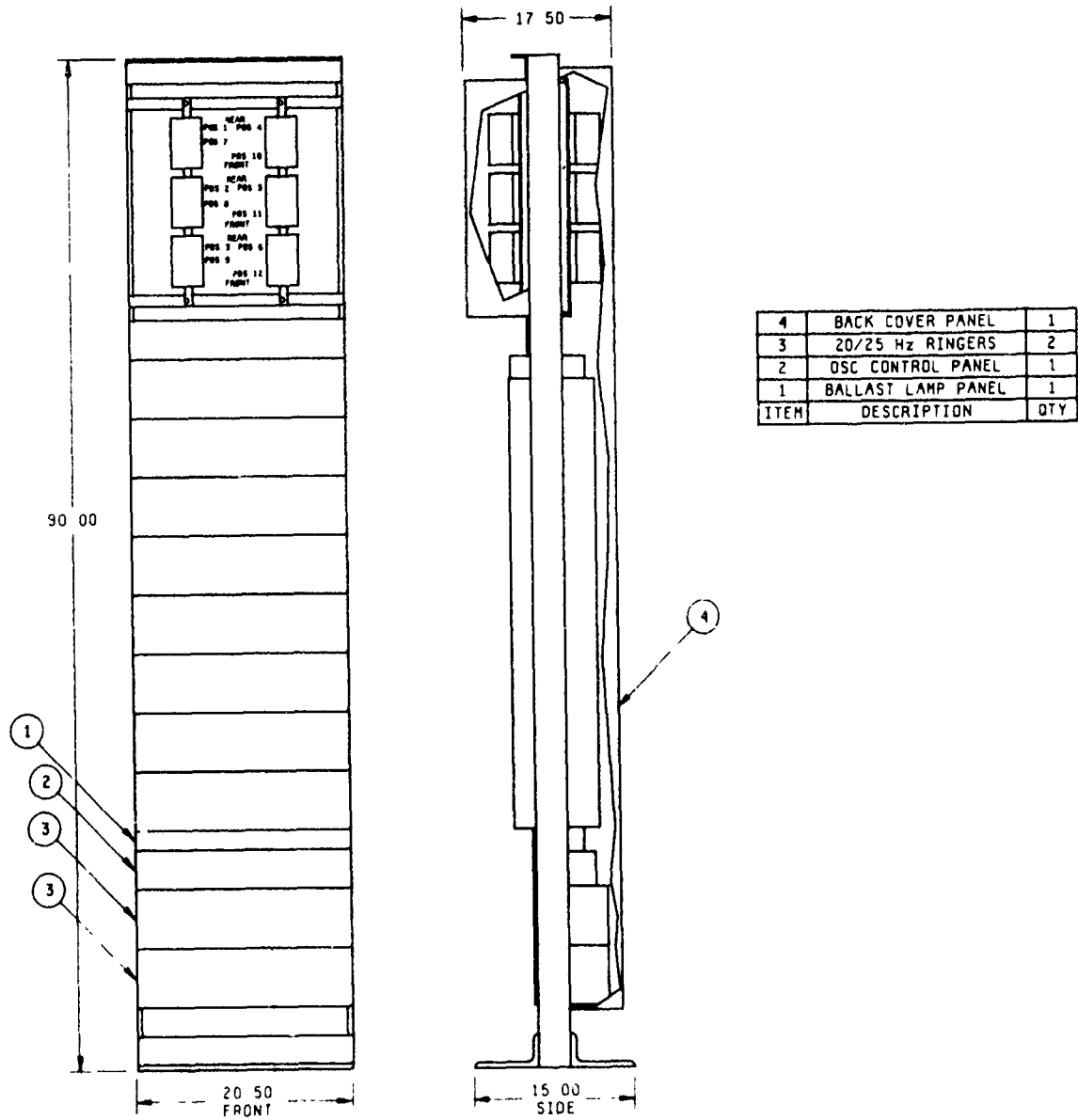
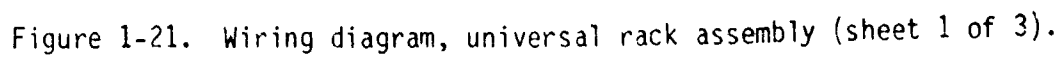


Figure 1-20. Universal conditioning equipment bay (sheet 2 of 2).

on the shelf connection. Figure 1-21 shows the wiring (printed and cabling) on the module shelf. Each connector on the shelf has its pins A-L wired to terminal block 1-6 at the top of the bay. Terminal blocks 7-12 are for outgoing or incoming signal cables. Cross connect is then performed between TB 1-6 and 7-12. It should be noted that only the input, output, and signaling leads for each module string need to be cross-connected to the in/out cable, reducing the amount of cables required from the LCE to the intermediate distributing frame (IDF). A nonuniversal rack assembly is no longer required or used. The single frequency supply cards formerly plugged into the single frequency supply shelves in the rack are now plugged into the universal rack assembly. A modified version of the universal rack is available when 20- or 25-Hz ringing supplies are required. This rack contains eight universal shelves, a fuse panel, and a 20- or 25-Hz ringing supply system (frequency must be specified when ordering). The ringing supply shown in figure 1-20, sheet 2, contain two 20/25-Hz oscillators, a control panel, and a 50-lamp panel. The output of the lamps appear on TB-5, now 11-20 (see fig. 1-21).

1.4.2.5.1 Digital line interface unit. The digital line interface unit (DLIU) USACEEIA Specification, CCC-75063, is a rack mounted plug-in module containing a full duplex DLIU (unit A and unit B) each of which provides: (a) interface (level conversion and dc isolation) between input-to-output combinations of high level neutral, high level polar, and low level polar data signals; (b) built-in loop battery fusing; (c) automatic adjustable loop current regulation (high level only); and (d) no-transition/open-loop detection and alarm. The DLIU contains two independent interface units on one plug-in printed circuit board assembly. The module is designed for mounting in a rack adapter shelf requiring 5-1/4 inches of vertical rack space in a standard 19-inch relay rack or cabinet. Up to six DLIU modules can be housed in one shelf. The DLIU has all its active elements mounted on a printed circuit card that slides into card guides and connects to a receptacle at the rear of the mounting shelf. All input-output connections, alarm closure connections, and loop and power voltages for the DLIU are brought to the DLIU module through the rear connector. The front of the DLIU mounts an output loop monitor jack, an open line/no transition alarm indicator light, and an output loop current adjust control for each of the two DLIU units. In addition, a single-blown fuse alarm lamp provides a monitor to indicate failure of any one of the module's fuses.

1.4.2.5.2 Loop resistor panel. The SB-1642 resistor panel provides hold battery and loop current to the dc teletypewriter circuits. The panel provides control of the loop current for high polar or neutral circuits. The SB-1642/G resistor panel consists of 24 circuits of fixed and variable resistors providing current values from 18 to 100 milliamperes and operates at 130, +60, and -60 Vdc. Each circuit is





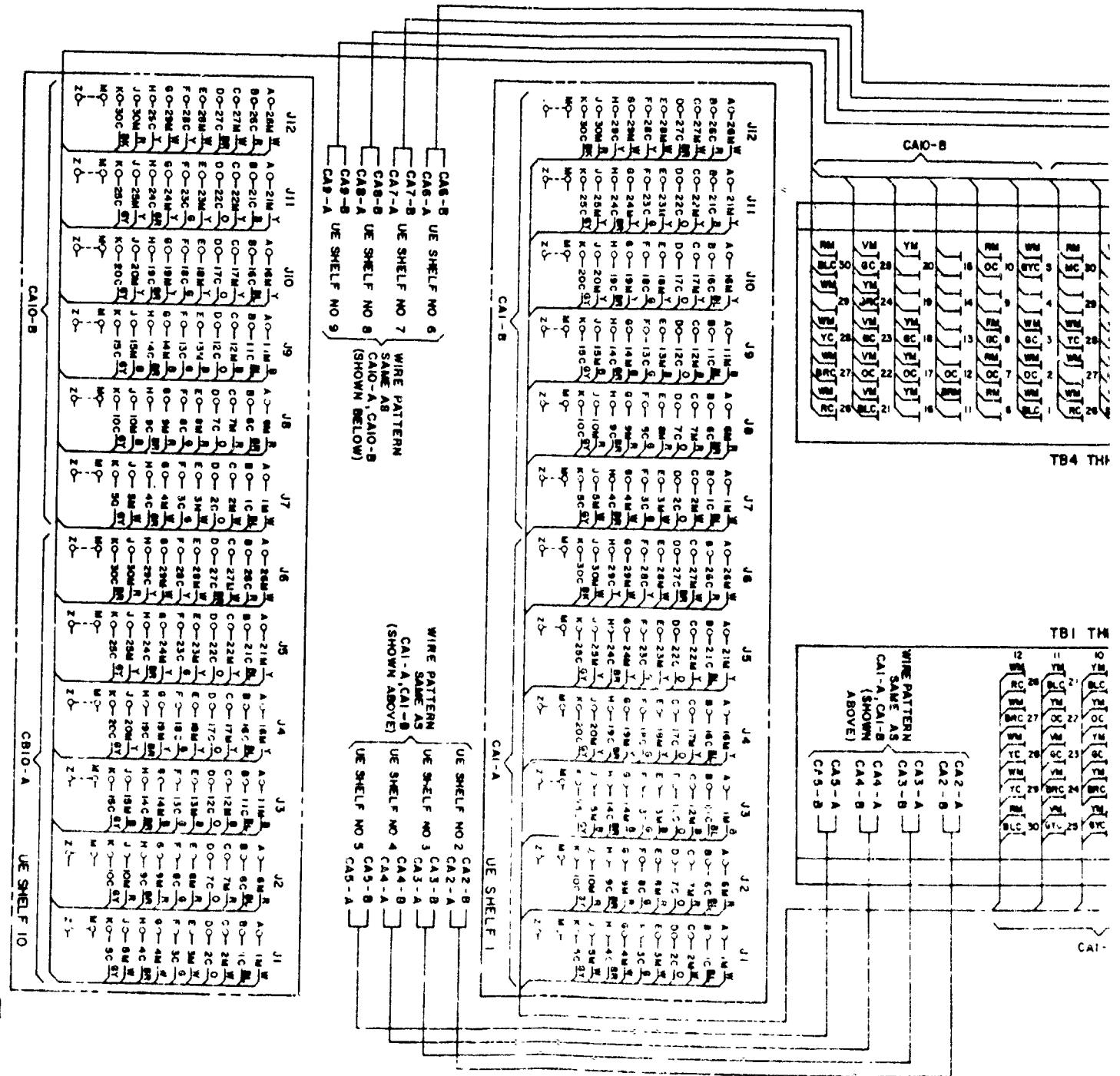
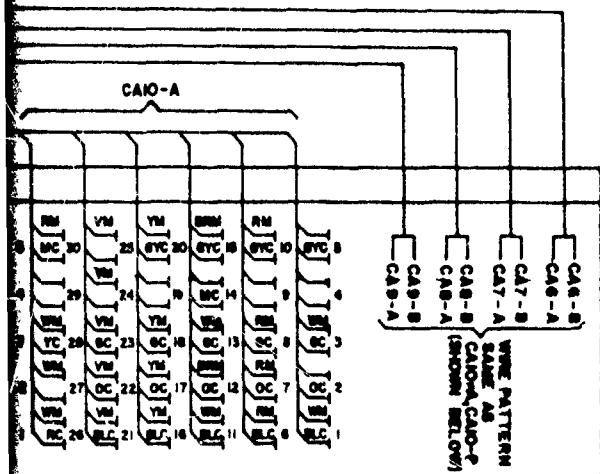


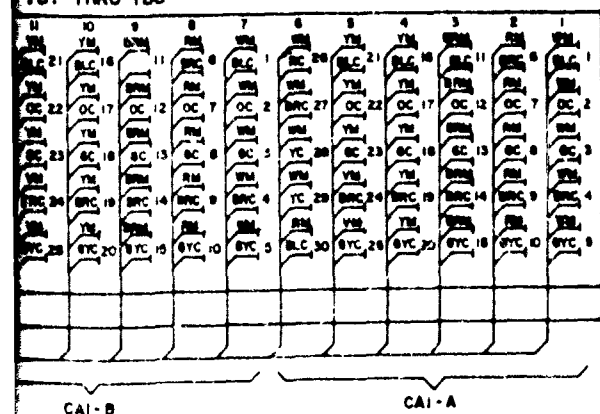
Figure 1-1. AIC  
universal rack system

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TB4 THRU TB6

TB1 THRU TB3



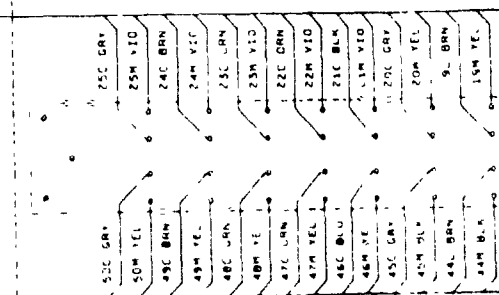
2

(ROW 11)

20/25 H2		P/O TB 5			
1	1M WHT 1C BLK 2M WHT 2C DRN 3M WHT 3C GRN 4M WHT 4C BRN 5M WHT 5C GRY	5			
11	6M RED 6C B K 7M RED 7C DRN 8M RED 8C GRN 9M RED 9C BRN 10M RED 10C GRY	15			
21	11M BLK 11C BLK 12M BLK 12C DRN 13M BLK 13C GRN 14M BLK 14C BRN 15M BLK 15C GRY	25			
31	16M YEL 16C BLK 17M YEL 17C DRN 18M YEL 18C GRN 19M YEL 19C BRN 20M YEL 20C GRY	35			
41	21M VIO 21C BLK 22M VIO 22C DRN 23M VIO 23C GRN 24M VIO 24C BRN 25M VIO 25C GRY	45			
50	26M WHT 26C RED 27M WHT 27C BLK 28M WHT 28C YEL 29M WHT 29C GRN 30M WHT 30C GRY	50			
	31M WHT 31C BLK 32M WHT 32C DRN 33M WHT 33C GRN 34M WHT 34C BRN 35M WHT 35C GRY				
	36M RED 36C BLK 37M RED 37C DRN 38M RED 38C GRN 39M RED 39C BRN 40M RED 40C GRY				
	41M BLK 41C BLK 42M BLK 42C DRN 43M BLK 43C GRN 44M BLK 44C BRN 45M BLK 45C GRY				
	46M YEL 46C BLK 47M YEL 47C DRN 48M YEL 48C GRN 49M YEL 49C BRN 50M YEL 50C GRY				

(ROW 20)

2 EA 32 PR CABLE  
22 AWG



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Figure 1-21. Wiring diagram, universal rack assembly (sheet 3 of 3).

provided with a pushbutton which connects a milliammeter to the circuit under test so that individual current readings may be obtained. There are 24 individual circuit fuses, a main fuse, and an alarm indicator lamp. A fuse alarm relay common to all fuses is provided for external use.

1.4.2.6 Circuit concentration frame bay. The circuit concentration frame bay (CCFB), USACEEIA Specification, CCC-75067, is the point in a technical control facility where cable or subscriber circuits interface the technical control facility equipment and where the cross connects are performed. The CCFB is being recommended to replace the open-type distributing frame. However, if a combined distributing frame (CDF), main distributing frame (MDF), or IDF is already in use and adequate space is available, the upgrade can be performed satisfactorily by using spare block spaces, the CCFB should not be used. The CCFB is an enclosed bay-type frame using patch plugs and cords to perform cross connects. The CCFB conserves space, wire, and cable which allows more circuits to be interfaced in a smaller area; and allows the use of shorter jumpers. The CCFB is the point where cross connecting between various equipment, subscriber cables, and multiplex channels within the technical control facility are performed.

1.4.2.6.1 Circuit concentration frame panels. Four basic circuit concentration frame panels (CCFP) configuration, USACEEIA Specification, CCC-75068, are recommended for use in the CCFB. These four panel layouts are shown in figure 1-22. Panel A contains 10 groups of 4 horizontal by 12 vertical pins. This panel is recommended for terminating frequency division multiplex (FDM), 12 channels of multiplex (mux) or demultiplex (demux) but is not limited to this application. Panel B consists of 10 groups of 4 horizontal and 13 vertical pins and is primarily used for outside cables. Panel C is designed for VFCT cable terminating with 10 groups of 4 horizontal and 16 vertical pins. Panel D is for patch panel terminating and cross/connecting with 9 groups of 6 horizontal by 25 vertical pins. The panels are wired to 50 pin connectors mounted on the rear for fast installations for the various connector requirements for each panel (see fig. 1-22, sheet 3). The last group of pins (right side) are not wired to the connectors (this allows special wiring and site use of one group per panel).

1.4.2.6.2 Circuit concentration frame bay configuration. The CCFB will be configured to the requirements of the technical control facility as required by selecting the type and quantity of CCFB required for each function. Figure 1-23 is a typical example. The example is used in section 4 to illustrate cabling and terminating as well as cross connecting.

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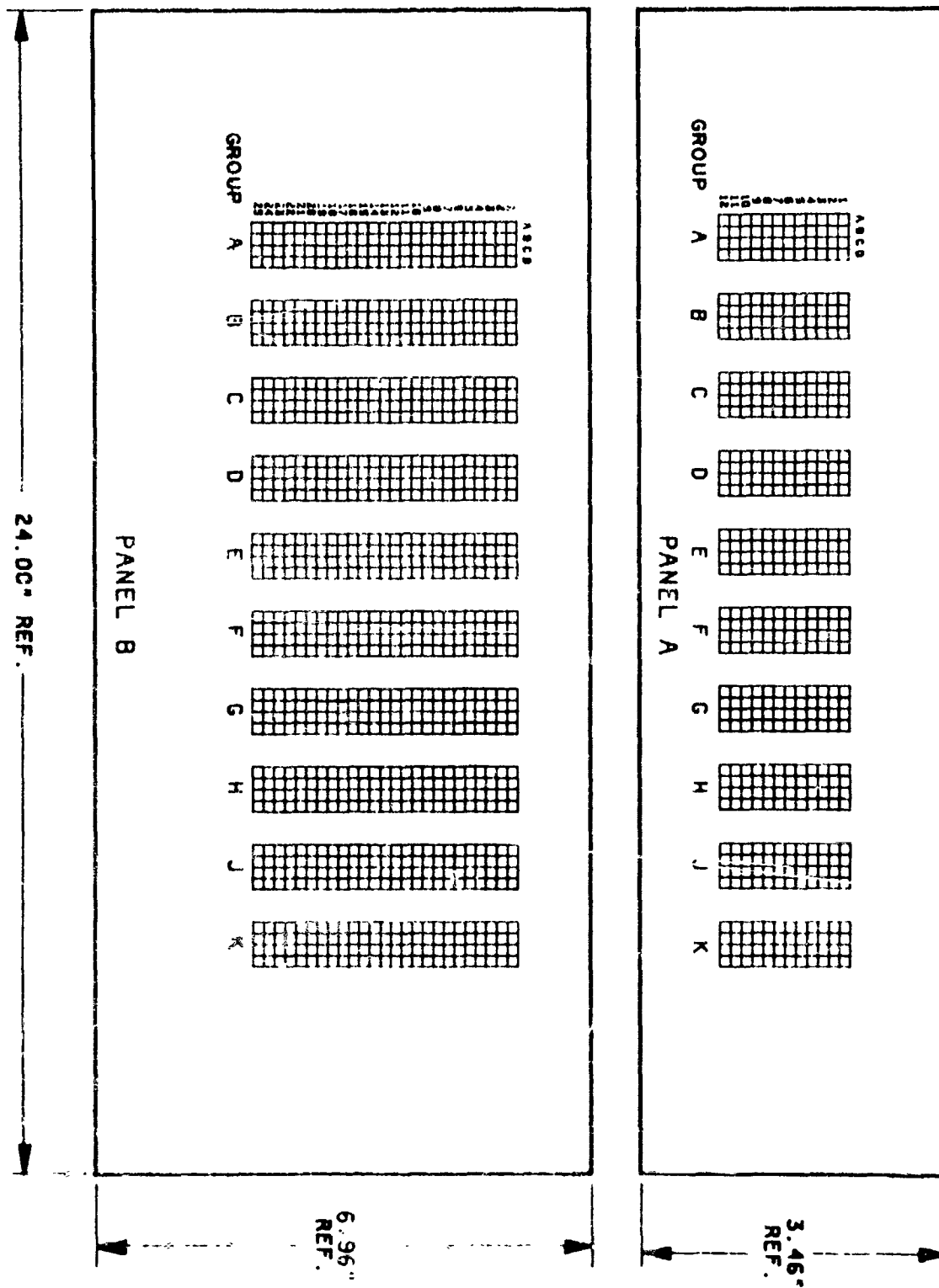


Figure 1-22. A, B circuit concentrated frame panel, USACEEIA Specification CCC-75068 (sheet 1 of 3).

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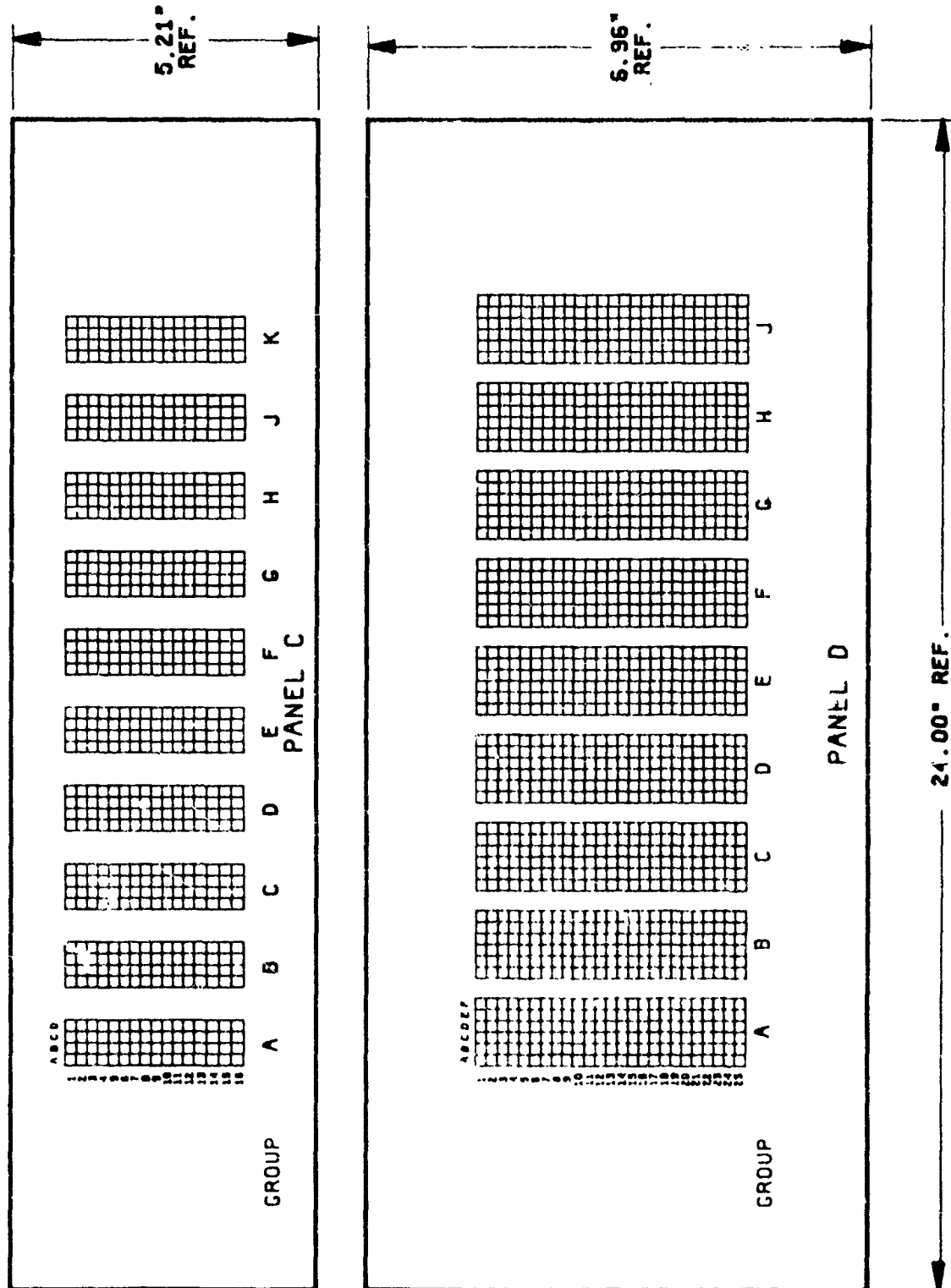
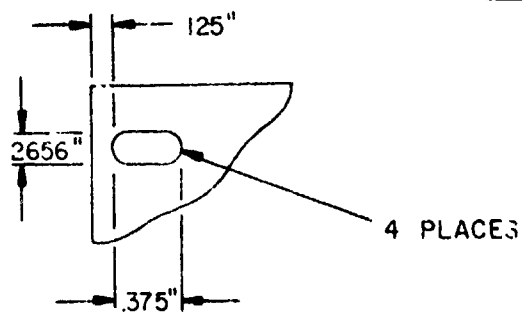
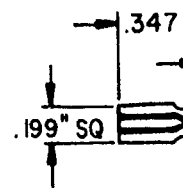
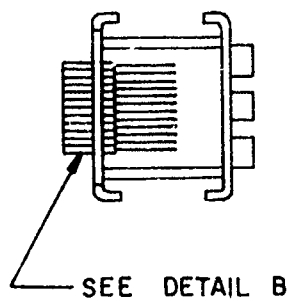
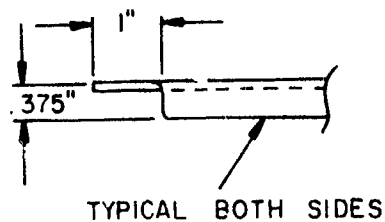
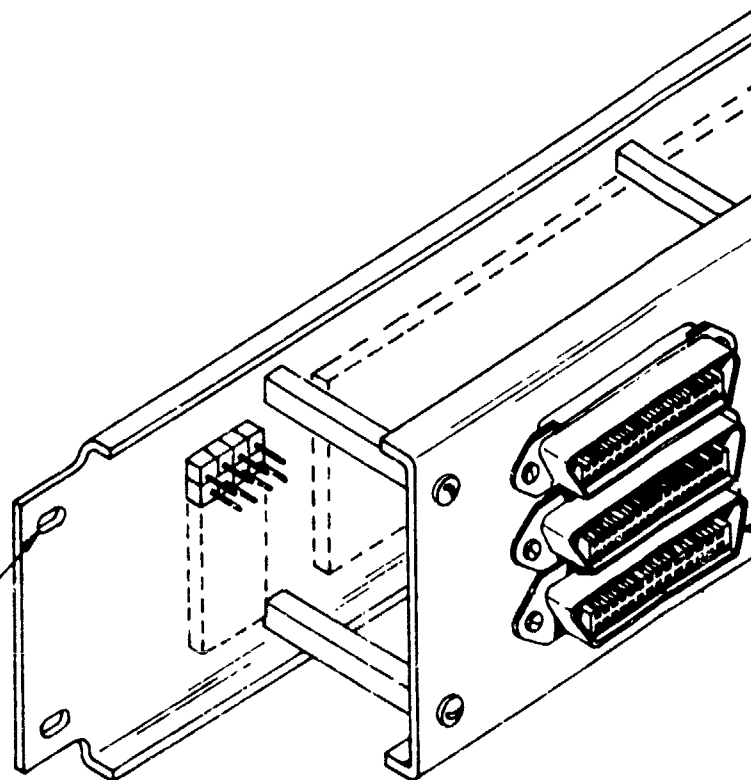


Figure 1-22. C, D circuit concentrated frame panel, USACEEIA Specification CCC-75068  
(sheet 2 of 3).



DETAIL 'A'

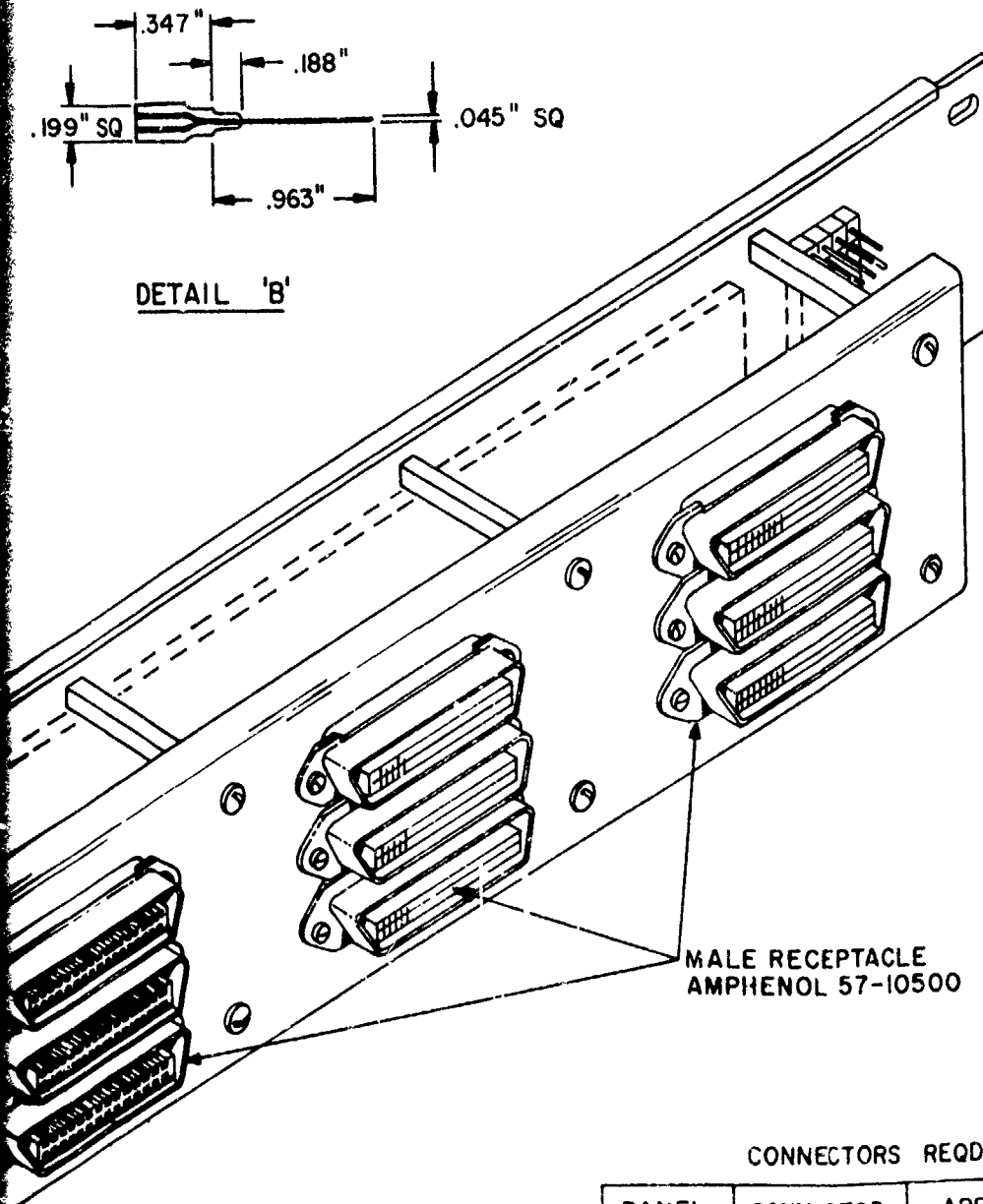
SEE DETAIL A





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CONNECTORS REQD

PANEL	CONN REQD	ARRANGEMENT
A	9	3 GP 3 EA
B	18	3 GP 6 EA
C	12	4 GP 3 EA
D	24	4 GP 6 EA

Figure 1-22. C, D circuit concentrated frame panel,  
USACEFIA Specification CCC-75068 (sheet 3 of 3).

		QTY	MATERIAL LIST ITEM	GFE	CFE
45	BLANK PANEL				
	MUX-CCFM CHANNELS 241-360	1	EQUIPMENT RACK EMCOR 328 OR EQUAL		
	WIRING TROUGH				
40	MUX-CCFM CHANNELS 361-480	4	CROSSCONNECT PANEL 10 GPS AT 48 PINS		
	EQUAL LEVEL BAY 1.6 CKTS 289-360	4	CROSSCONNECT PANEL 8 GPS AT 156 PINS		
35	WIRING TROUGH	6	CROSSCONNECT TROUGH		
	EQUAL LEVEL BAY 1.7 CKTS 361-456	1	BLANK PANEL 1 3/4" EMCOR PNA-1		
30	WIRING TROUGH	2	BLANK PANEL 8 3/4" EMCOR PNA-8		
	EQUAL LEVEL BAY 1.8 CKTS 457-552				
25	WIRING TROUGH				
	EQUAL LEVEL BAY 1.9 CKTS 553-648				
20	WIRING TROUGH				
	COND EQPT BAYS 3.2.3.3 CKTS 241-360				
15	WIRING TROUGH				
	COND EQPT BAYS 3.1.3.2 CKTS 361-448				
10	WIRING TROUGH				
	BLANK PANEL				
5					
4					
3	BLANK PANEL				
2					
1					
0	BAY 1.9				

Figure 1-23. Typical circuit concentration frame bay (CCFB)  
USACEEIA Specification, CCC-75067.

1.4.2.6.3 Protector block. There may also be a requirement for line protectors at the technical control facility. Figure 1-24, recommended line protector, is the Cooke Electric, type 303. Mounting brackets are available from Cooke Electric or may be fabricated to allow the protector block to be horizontally mounted in a 24-inch equipment rack. Four types of protector panels are available: carbon arrestor, heat coil and carbon arrestor, straight through (no protection), and fail safe gas arrestor.

1.4.2.7 Voice frequency primary (cable) test bay.

1.4.2.7.1 General. A vf primary test bay is not required at all technical control facilities. The determining factor to be considered is the method in which the subscribers cable access the technical control facility. If the cable enters via a dial central office (DCO), the DCO will provide cable quality checks and subscriber signaling tests in their test operations. Also a vf primary test bay may not be required at small sites or sites where a small amount of outside cable exists. In these technical control facilities, a vector impedance meter or an ac impedance meter and a pulse signaling test set may be mounted in the quality assurance (QA) center. In technical control facilities where a vf primary test bay is required, a suggested bay configuration which includes a transmission test set is shown in figure 1-25.

1.4.2.7.2 Vector impedance meter. A typical vector impedance meter is the Hewlett Packard, model 4800A, or equal with rack mounting kit. The 4800A will make fast measurements of impedance up to 10 megohms and phase to  $\pm 90$  degrees of unknown two-terminal networks. Measurements can be made at a particular frequency or over a continuous range from 5 Hz to 500 kHz. The instrument may be mechanically swept to produce continuous measurement over its full frequency range. Analog outputs are available for X-Y recording. The unit is powered from 115 V  $\pm 10$  percent 48 Hz to 448 Hz.

1.4.2.7.3 Dial pulse test set. A recommended dial pulse test set is the Lenkurt (GTE Lenkurt, Inc.) model no. 26600-01 or equal. The set mounts in a standard 19-inch rack and is powered by the 48-Vdc battery plant requiring 0.5 amperes. The Lenkurt's 26600 signaling test set tests any E&M pulsing arrangement. A switch in the M lead selects battery/open or battery/ground, while a similar switch in the E lead selects either the ground/open or the ground/battery condition. The test set measures both the speed and ratio of continuous pulses or short trains of pulses. Pulse speeds, from 2 to 25 pulses per second and ratios from 0 to 100 percent, make or break, are indicated on a single meter. The pulse rate of the generator is continuously adjustable from 3 to 20 pulses per second, while the dial-controlled pulsing is a nominal 10 pulses per second. Pulse width of either

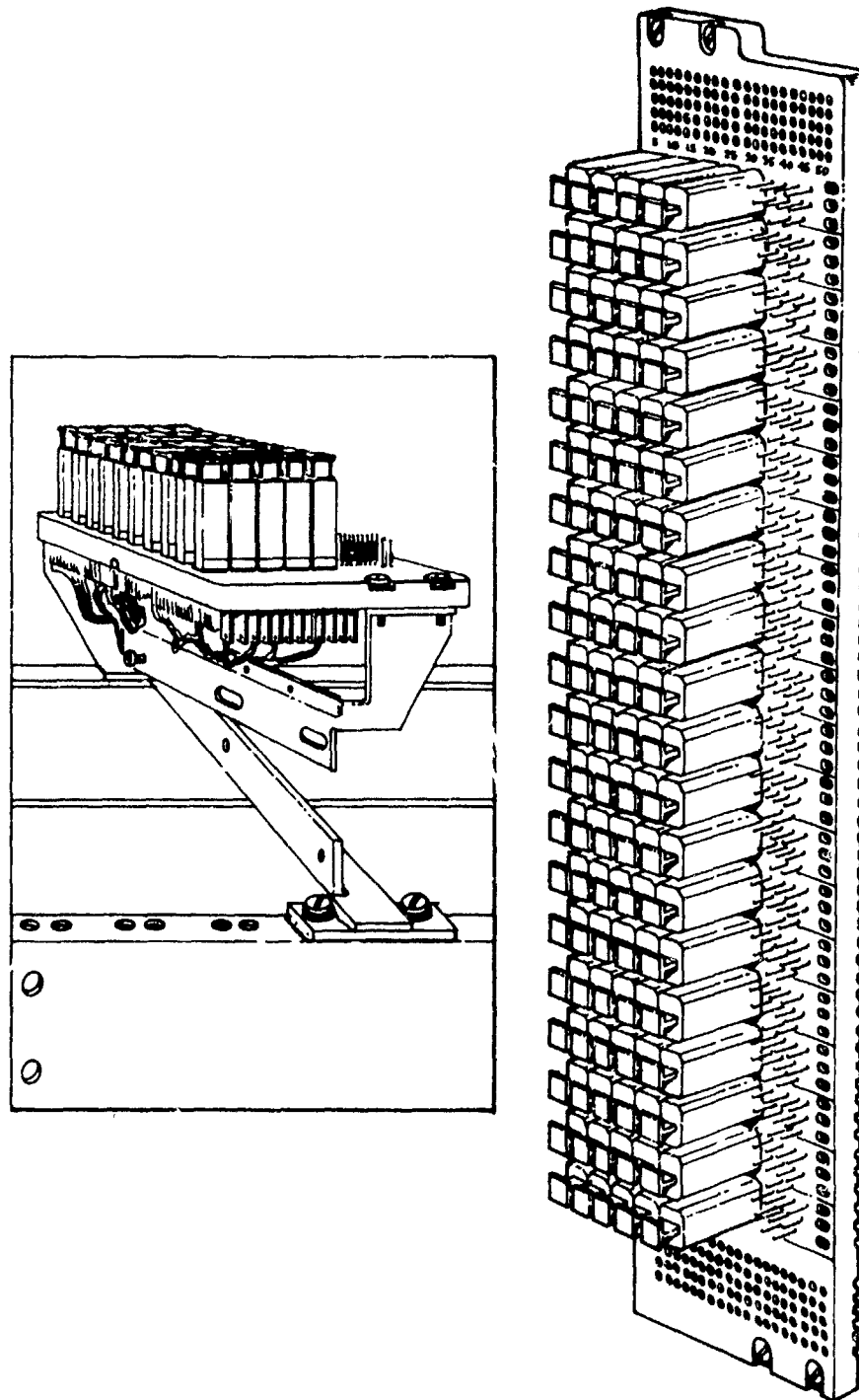


Figure 1-24. Line protector block, Cook Electric, type-303.

45	BLANK PANEL	QTY	MATERIAL LIST ITEM	GFE	CFE
	BLANK PANEL	1	EQUIPMENT RACK CCC-75054		
40	BLANK PANEL	1	TRANSMISSION TEST SET HP-3550 B		
	TRANSMISSION TEST SET HP-3550 B AN/USM-181	1	VECTOR IMPEDANCE METER HP-4800 A		
35	VECTOR IMPEDANCE METER HP-4800 A	1	DIAL PULSE TEST SET LENKURT 26600		
30	BLANK PANEL	1	INTERBAY PATCH PANEL CCC-75048		
	DIAL PULSE TEST SET LENKURT 26600	1	MISC PATCH PANEL CCC-75049		
25	INTERBAY PANEL	1	WRITING SHELF ENCOR RS-18A		
	MISC PANEL	2	BLANK PANEL 1 3/4" ENCOR PNA-1		
20	WRITING SHELF	1	BLANK PANEL 3 1/2" ENCOR PNA-3		
	BLANK PANEL	2	BLANK PANEL 5 1/4" ENCOR PNA-5		
15	BLANK PANEL	2	BLANK PANEL 8 3/4" ENCOR PNA-8		
	BLANK PANEL	1	BLANK PANEL 7" ENCOR PNA-7		
10	BLANK PANEL				
5	BLANK PANEL				
4					
3					
2					
1	AC CONV				
0					

Figure 1-25. Cable test bay.

the generator or the dial is continuously adjustable from 5 milliseconds to 275 milliseconds, thus permitting a wide range of percent break. The 26600's P jack permits pulsing from an external source at 60 or 120 impulses per minute for out-of-service testing of Western Electric E&M single-frequency signaling equipment. For loop-dial testing, the 26600 signaling test set's received pulses are repeated by a standard 200/200-ohm pulse-repeating relay which is factory adjusted in accordance with telephone industry standards for pulse-repeating test sets. This relay simulates the A relay of the incoming selector, and ensures that when pulsing requirements of a carrier channel are met on a test basis, only minor variations will be experienced when the channel is placed in operation. An optional artificial trunk unit enables the testing of pulse repeating relays in local interoffice trunk circuits or toll transmission selectors arranged for loop or battery/ground pulses. The unit simulates the line resistance of the physical pair and allows single ended alignment of the trunk circuits or selectors.

1.4.2.7.4 Transmission measuring set. A recommended transmission measuring set is the HP-3550B or equal with Rack Adaptor, HP-5060-8762, or equal. This combination allows the HP-3550B to be mounted in a standard 19-inch rack. The set is powered from 115 or 230 V  $\pm 10$  percent, 48 Hz to 448 Hz total of 7 VA. The set also contains four rechargeable batteries for up to 40 hours of operation without recharge. The batteries may be recharged up to 500 times (recharger self-contained). The model 3550B is designed to measure transmission line and system characteristics such as attenuation and frequency response or gain. It is particularly useful for lineup and maintenance of multichannel communications systems. Model 3550B contains a wide range oscillator, a voltmeter, and a patch panel to match both the oscillator and the voltmeter to 135-, 600-, and 900-ohm lines. The oscillator, voltmeter, and patch panel may be used separately whether they are in or removed from the mounting. Both the oscillator and voltmeter are transistorized and operate from their rechargeable battery.

1.4.2.8 Direct current test bay. A test bay is required for the primary dc circuits and the equipment shall be configured for high level test. A dc test bay is also required in the low level circuit patch area configured for low level tests. Each bay may contain any or all the equipment described in MIL-STD-188-310, paragraph 5.5.4. In addition to this equipment, a channel breakout monitor as described in MIL-STD-188-310, paragraph 5.4.3.3, may be required in the low level (circuit) test bay. The dc test bay shown in figure 1-26 contains a telegraph signal test set and a multimeter. This bay may also require a channel breakout monitor when used in the low level patch area. The equipment will be used for testing high level

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45	BLANK PANEL	QTY	MATERIAL LIST ITEM	GFE	CFE
	BLANK PANEL	1	MULTIMETER HP-410C/DIGITEC 269		
40	TEST METER PANEL	1	RACK ADAPTER 5060-8762 HP		
35	BLANK PANEL	1	DATA TEST SET AN/GGM-15VI		
	MULTIMETER		INTERBAY PANEL CCC-75052		
30		1	MISCELLANEOUS PANEL CCC-75049		
	DATA TEST SET AN/GGM-15 VI		WRITING SHELF ENCOR RS-18A		
25			BLANK PANEL 1 3/4" ENCOR PNA-1		
20	BLANK PANEL	1	EQUIPMENT RACK CCC-75054		
	INTERBAY PANEL		BLANK PANEL 3 1/2" ENCOR PNA-3		
	MISC PANEL	1			
15	WRITING SHELF	4	BLANK PANEL 7" ENCOR PNA-7		
	BLANK PANEL	1	TEST METER PANEL		
10					
5					
2					
1					
0					

Figure 1-26. Dc test bay.

circuits in the dc primary patch area and low level in the dc circuit patch area.

1.4.2.8.1 Telegraph signal test set. The telegraph signal test set for the dc test is the Digitec 9600 or AN/GGM-15(V)1 or equal. This test set must be modified to accept PJ-051 test plugs. This unit is rack mounted in a 19-inch rack and powered by 115/230 Vac at 47 Hz to 63 Hz. This test set is made up of three major units: Signal Generator, SG-860/GGM-15(V); Signal Distortion/Analyzer, TS-2862/GGM-15(V); and Oscilloscope, OS-206/GGM-15(V). For technical characteristics, see TM 11-6625-1668-12.

1.4.2.8.2 Multifunction meter. A multimeter for use in the dc test is the HP-410C or equal with Mounting Panel, 5060-3762, or equal. This mount allows for rack mounting of the meter in a standard 19-inch rack. The power requirement for the HP 410C is 115/230 Vac, 50 Hz to 400 Hz at 20 VA. The HP-410C is a versatile general purpose instrument for use anywhere electrical measurements are made. This one instrument measures dc voltages from 15 mV to 1500 V direct current from 1.5 microamperes to 150 mA full scale, and resistance from 0.2 ohms to 500 ohms. With a standard plug-in, probe ac voltage at 20 Hz to 700 MHz from 50 mV to 300 V and comparative indication to 3 GHz are attainable.

1.4.2.8.3 Channel breakout monitor. The channel breakout monitor (telegraph carrier test set) can be located in the dc test bay used for low level testing or in any convenient bay in the low level patch area. The test set can be substituted by a spare VFCT. The input (vf) of the test set or VFCT will terminate in the equal level patch area, and the demodulated dc output line terminates in the dc low level patch area. The set is used for demodulating a tone pack of a VFCT for test and distortion measurements; it also provides a keyed dc signal for monitoring purposes. The test set is especially useful in technical control facility/PTF that has VFCT tone packs traversing the station but have no VFCT's.

1.4.2.8.4 Hubbing equipment. Recommended hubbing equipment for dc circuits is available from the Pulsecom Division of Harvey Hubbell, Inc. An equal substitute is also recommended. The Pulsecom series of interfacing and hubbing modules are solid state devices which may be employed to interface circuits and terminal equipment of the same or different operating characteristics. The inputs to the 950 series are resistive; therefore, the operating voltage on the current side is not significant, and the number of repeaters placed in tandem is limited only by the operating current. Through distortion is very low at high speeds even when a large number of repeaters are connected in the same configuration. A description of these repeaters follow.



1.4.2.8.4.1 The Pulsecom, model 954-1, data repeater, is an all solid state device for interconnecting voltage operated data circuits. It may be used for EIA RS-232-B to MIL-STD-188-C conversion, EIA to hub, or MIL-STD-188-C to hub. Each repeater is a single plug-in module which occupies one mounting space in a Pulsecom, model 10306-2L10 series, mounting shelf. One, model 10306-2L10, mounting shelf will accommodate fourteen 954-1 repeater modules and one Pulsecom, model 5862-1L2, power supply.

1.4.2.8.4.2 The Pulsecom, model 308-1, stop-start regenerative repeater is an all solid state device designed to reconstruct highly distorted data signals and retransmit them with less than 3 percent distortion. The model 308-1 possesses self-contained, high stability oscillators for speeds up to 1800 baud. The unit is designed to interface with various voltage configurations including MIL-STD-188-C and EIA. The model 308-1 mounts in a model 10306 shelf. The 950 series of data repeaters mount in the same shelf. As many as 16 repeaters, all model 308-1-type or, arranged in various hubbing configurations with the 950 data repeater series, interface in the same model 10306 shelf. Features are eight programable or EIA RS-232-B data lines; "mark hold" strapping option; code levels 5, 6, 7, or 8; only a voltmeter required for calibration; designed for false-start deletion; integrated circuits combined with discrete components for maximum reliability; single printed circuit module.

1.4.2.8.4.3 Accessories.

a. Model 10306, mounting shelf. Sixteen modules fit in the 3½-inch by 19-inch shelf.

b. Model 5862-1L2, power converter module. This module can be provided to accommodate logic and voltage interface requirements for repeaters. This supply occupies one slot in the 10306 mounting shelf.

1.4.2.8.5 Teletypewriter monitor. The AN/UGC-61X, teletype monitor set, is used for monitoring the low level TTY circuits. By the use of a DLIU, it can be used to monitor the high level circuits. The AN/UGC-61X keyboard send-receive (KSR) TTY set is an electromechanical apparatus that provides terminal facilities with two receive only, one KSR set, and a control panel. It is enclosed in a cabinet 72 inches high by 21½ inches wide by 28 inches deep.

1.4.2.8.6 Metering panel. In addition to the equipment above, a metering panel is required for local current and battery voltage checks. This panel will be mounted in the dc high level patch bays one for one. The panel recommended is the Northern Radio 310, model 1, for high level and SAAD-D-40177 for low level or equivalents. The

panel requires three rack spaces in a standard 19-inch rack. It contains two large easy-to-read meters, one milliammeter with a range of 75-0-75 mA dc and the other is a voltmeter 150-0-150 Vdc. The low level panel only contains a digital voltmeter.

1.4.2.8.7 Interbay and miscellaneous panels. The interbay and miscellaneous panels function the same as discussed in paragraphs 1.4.2.2.2 and 1.4.2.2.3.

1.4.2.8.8 Ballast lamp panel. A ballast lamp panel is used to protect the dc circuits by limiting the current that can be drawn from the power source. The panel recommended is USACEEIA Specification, CCC-75066, panel or equal. This panel is available in +6 V models and contains 32 lamps plus two fuses (one for each string of 16 lamps). The panels should be located near the loop current supplies.

1.4.2.9 Quality assurance test center. The QA test center may contain one or more bays of test equipment. This test center performs the narrowband test required by DCAC 310-70-1 and DCAC 300-175-9. The QA test center will contain the equipment required by DCAC 310-70-1 for narrowband voice testing. The equipment will be mounted in standard 19-inch racks and may require from one to four racks depending on the requirements of the site. Figure 1-27 depicts the typical rack elevations of a QA test center. The equipment listed and discussed in this section are suggested items. DCA circulars, CCP 750-2, and site circuit QA requirements should be considered before making equipment selection.

1.4.2.9.1 Root-mean-square voltmeter. The Hewlett Packard, model 3400A, is a true root-mean-square (rms) voltmeter which provides a meter indication proportional to the dc heating power of the input waveform. In addition to its meter indication, the model 3400A provides a dc output proportional to meter deflection making it a useful true rms detector for graphic recording and digitizing with a dc digital voltmeter. Versatility of the model 3400A is enhanced by its wide 10-Hz to 100-MHz frequency response, high crest factor, 1-mV to 300-V full-scale sensitivity, and 10-megaohm input impedance. The 6-decade frequency coverage makes the 3400A extremely flexible for all audio and most vf measurements and permits the measurement of broadband noise and fast-rise pulse. A wide range of sensitivity (12 ranges) allows measurement of anything from down-in-the-grass signal and noise to transmitter and amplifier outputs (with 30-dB overload protection). Pulses or other nonsinusoids with crest factors (ratio-to-peak to rms) up to 10:1 can be measured full scale. Crest factor is inversely proportional to meter deflection, permitting up to 100:1 crest factor at 10 percent of full scale. The ability of the 3400A to accept waveforms with such large crest factors ensures accurate noise and pulse measurements without the need for correction factors.

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Figure 1-27. QA test center (sheet 1 of 3).

Figure 1-27. QA test center (sheet 2 of 3).

45 40 35 30 25 20 15 10 5 0	MATERIAL LIST ITEM	GFE	CFE
BLANK PANEL	EQUIPMENT RACK CCC-75054		
FREQUENCY COUNTER	FREQUENCY COUNTER HP 5300A/5302A		
PHASE JITTER METER	RACK ADAPTER HP-10574A		
FREQUENCY SELECT VM	PHASE JITTER & HIT MONITOR HEKIMIAN 48A3 E/W RACK ADAPTER		
ENVELOPE DELAY MEASURING SET	FREQUENCY SELECT VOLT METER HP-3581C		
BLANK PANEL	ENVELOPE DELAY MEASURING SET, TS-2669GCM (ACTION 4908)		
BLANK OR INTERBAY PANEL	INTERBAY PATCH PANELS CCC-75048		
INTERBAY PANEL	MISC PANEL CC-75049		
MISC PANEL	WRITING SHELF EMCOR RS 18A		
WRITING SHELF	BLANK PANEL 1 3/4" EMCOR PNA-1		
BLANK PANEL	BLANK PANEL 6 15/16"		
	BLANK PANEL 8 1/16"		
	BLANK PANEL 7" EMCOR PNA-7		

Figure 1-27. QA test center (sheet 3 of 3).

Permanent plots of measured data and higher resolution measurements can be obtained by connecting an X-Y plotter, strip chart recorder, or digital voltmeter to the convenient rear panel dc output. The dc output provides a linear 0-V to 1-V drive proportional to meter deflection. True rms current measurements can be made conveniently by using the HP, model 456A, current probe with the model 3400A. Accessories available are 11001A cable, 45 inches long, male BNC to dual banana plug; 10503A cable, 4 feet long, male BNC connectors, 11002 test lead, dual banana plug to alligator clips; 11003A test leads, dual banana plug to probe the alligator clip, ac current probe, HP, model 456A, 1 mV/1 mA; Pack Adaptor, HP-5060-8762. HP, model 3400A, option 001, spreads out the decibel scale by making it the top scale of the meter. Rear terminals in parallel with front panel terminals and linear log scale uppermost on the meter face are available on special order.

1.4.2.9.2 Noise measuring set. The model, TTS 37/BR, by Northeast Electronics is a rack mounted, transistorized set designed to measure a wide range of transmission levels, volume unit and noise. It has a sensitivity of -80 dBm at 0 dB on the meter which has a scale calibrated to -15 dB, thus providing a measurement range to -95 dBm. The meter is also calibrated in decibel referenced on noise (dBrn), thereby permitting noise measurement to -5 dBrn. Attenuators, 1-dB and 10-dB step, provide a range of level control of 100 dB. Switchable filters are provided internally to either reject the low frequency band around 60 Hz and its harmonics, or to reject frequencies above the voice band. A C-message weighting filter is also included. Circuits of either 600 or 900 ohms, balanced or unbalanced, can be measured in either a terminated or bridging condition. Noise to ground may also be measured with a 40-dB loss. Provisions for dialing out on a line and a switchable hold coil are available. Monitoring jacks for ac and dc output signals are provided.

1.4.2.9.3 Impulse noise measuring set. The Northeast Electronics, model TTS58AR-19, impulse counter, provides a means for counting impulses. The peak amplitude of these impulses fall within each of three preselected level ranges. Three 4-digit register circuits, each with a 20-dB attenuator, are used to display the number of impulses counted; consequently, there is a total range of 20 dB over which the counters will operate. Two registers will only count impulses within the level range for which they are set; the third counter counts all pulses which exceed the level for which it is set. Consequently, it is possible to determine several points on the impulse level distribution curve of the circuit under test. A timer is available to establish a counting limit up to 1 hour; a continuous position on this timer permits operation beyond the 1 hour limit. The overall sensitivity of the set permits measurements over a 20-dB level range between the levels of 0 to 90 dBrn on either a bridging

or terminated basis. Built-in switchable filters and weighting networks are provided and means are included for connecting external filters. In addition to the flat response and voice filters normally used for impulse noise counting in the voice frequency range, a 10.2-kHz to 51-kHz filter is provided for testing 40.8-kilobit data systems. A monitor jack is available to permit listening to the noise on the circuit without interfering with the count.

1.4.2.9.4 Transmission measuring set. The recommended transmission measuring set is described in paragraph 1.4.2.7.4.

1.4.2.9.5 Frequency counter. The HP-5300A is a precision frequency counter which will measure frequencies to 50 MHz and time intervals with 100 nanoseconds resolution. The 5300A also has autoranging. Autoranging enhances ease of operation by automatically selecting the correct gate time to fill the display. Any frequency within range of the 5302A may be applied, and the counter will select the correct gate time up to 1 second for maximum resolution without exceeding the display range. On the 5302A, autoranging is also provided for the period average function to select the number of periods to be averaged. Additional features of the HP-5300A/5302A include expandability through interchangeable modules, battery operation, compactness, ruggedness, use of light emitting diodes (LED), quiet easy service, and a binary coded decimal (BCD) output.

1.4.2.9.6 Phase jitter meter. The phase jitter meter recommended is the Hekiman Laboratories Inc. model 48 with option A3, or equal, rack mountable. The model 48 meets Bell System practices specifications for the measurement of phase jitter and displays P-P jitter on 3-degree and 30-degree full scale ranges. Phase hits of 5 degrees through 45 degrees in 5-degree increments, amplitude (gain) hits of +1, 2, 3, and 6 dB, coincident phase/amplitude hits and line dropouts are also detected and totalized. When totalized data is not required, flashing indicators may be selected and a timer is included for unattended data gathering. A CAUTION lamp indicates when the input frequency or level is incorrect, and the unit operates with both conventional and T-type carrier test frequencies. It is completely self-contained, includes an internal test tone source input/output level and input frequency monitoring, and multiple input termination impedances with line holding. Outputs are provided for phase jitter recording, spectrum analysis, and event recording of all hit and dropout occurrences. A CARRIER output provides a noise-free duplicate of the input test tone and may be used for accurate, noise-free measurements of frequency offsets in conjunction with an electronic frequency counter. A switchable hit delay reduces the sensitivity of the hit measurements to impulse noise effects. For fixed installations, a rack shelf adapter is available. Total weight is less than 20 pounds. The option A3 provides the following capabilities. Phase

jitter measurements in a group voice/data channel or directly on pilots in the wideband portions of multiplex systems may be made with this option. It uses a dual conversion intermediate frequency (IF) filter designed to reject adjacent frequency signals which could cause measurement errors. It is available with a variety of input impedances, balanced/unbalanced inputs, input connectors, and operating level ranges.

## SPECIFICATIONS

## INPUT

Frequency	990 to 1030 Hz
Level	-40 to +10 dBm
Impedance	600,900 ohms bridging
Line hold	600,900 ohm-positions

## OUTPUT

Frequency	1020 Hz $\pm 2$ Hz
Level	-40 to 0 dBm
Impedance	600 ohms

## METER

P-P phase jitter	3 degrees and 30 degrees full scale
Input/output level	-20 to +2 dBm
Frequency	990 to 1030 Hz

## CAUTION LAMP

Indicates incorrect frequency or level

## TOTALIZERS

Phase hits (peak)	5 degrees to 45 degrees, 5-degree steps
Amplitude hits	+1, 2, 3, 6 dB
Coincident hits	1.0 microsecond or greater
Dropouts	-12 dB (10 milliseconds)

## EXTERNAL OUTPUTS

Phase jitter, all totalizers, noise free test tone

## VOLTAGE

105/125 Vac, 47 to 400 Hz

## DIMENSIONS

8" high X 14" wide X 9½" deep  
5¼" high x 19" wide x 15½" deep (rack)

1.4.2.9.7 Frequency selective voltmeter. The Hewlett-Packard model 3591A, wave analyzer, offers automatic, state-of-the-art detection of signal amplitude and frequency information. Over a frequency range of 20 Hz to 620 kHz, the analyzer can separate frequency components of an input signal to locate the fundamental, harmonics, intermodulation



products, or any other signals present in the spectrum. Selectable bandwidths of 10, 100, 1000, and 3100 Hz permit easy location of signals and separation of closely spaced components. Operation has been greatly simplified by automatic amplitude ranging and electronic sweeping. X-Y recorder outputs permit frequency spectrum recordings to be made covering the entire frequency range with a linear dB amplitude display of 90 dB. Both X and Y recorder outputs are available at the rear panel of the 3591A. These outputs produce either logarithmic or linear varying dc voltages. Any combination of X and Y log or linear outputs (lin-lin lin-log, log-lin, or log-log) can be chosen to provide maximum flexibility. Recordings can also be made on standard semilog graph paper to produce direct plots. Y-axis log and linear outputs occur simultaneously, but the X-axis output is switched to choose the output function. When the switch is in linear (ramp only), the dc offset produced by the start frequency location is blocked out. This permits wide expansion of a narrow sweep segment without having to buck out the offset voltage. A contact closure drops the pen during the sweep. During retrace and standby, the pen is lifted.

1.4.2.9.8 Envelope delay measuring set. The TS 2669GGM offers an optimum combination of versatility and accuracy. The extended frequency range provides the capability of measurements beyond super-group (to 600 kHz) and down to below vf (100 Hz). Accuracy of measurement is  $\pm 1$  microsecond with a 250-Hz modulating frequency which is compatible with Defense Communications Agency requirements for super-group measurements. Three modulation frequencies: 25 Hz, 82-1/3 Hz, and 250 Hz are supplied with the TS 2669. The instrument will make end-to-end, end-to-end with returned reference, and loop measurements; and is compatible with other existing instrumentation of this type. A carrier frequency is provided for the return reference mode of operation. This permits varying the return reference carrier to any frequency within range of TS 2669.

1.4.2.9.9 Dual chart recorder. The HP-7702B offers full performance specifications determined by the choice of 8800-series preamplifier. Chart speeds: four speeds standard (1, 5, 20, and 100 mm/s mechanically shifted and selected by front panel pushbuttons). Other speed combinations available as options. Provision is made for optional remote control of chart drive from suitable 115 Vac source. Time-of-marker: separate stylus marks on edge of chart with 1 second pulses in TIME position or with line frequency pulses in MARK position; remote marking provision at rear connector by simple contact closure (115 Vac). Front panel controls: individual stylus heat controls; push-buttons for power, timer, marker, and speed election; and individual galvanometer damping screwdriver adjustments. Standard paper, 200-foot rolls of 5-cm wide, 2-channel Permapaper (651-51) may be used if only one channel is operated; orange translucent Permapaper (651-182) is available for making multiple ozalid copies. Automatic paper take-up

is a standard feature of the equipment. Power 115/230 V +10 percent, 60 Hz, approximately 200 VA; 115/230 V +10 percent, 50 Hz, available in option 008. The 8801A dc coupled preamplifier is the primary general purpose device used to couple external signals to the recorder. This unit features a front-panel range switch and lockable gain vernier and zero position controls. Positive and negative zero offset is standard with switchable ranges and a lockable, 10-turn potentiometer with calibrated dial face. A switch-selected, internal  $\pm 1$  percent calibrator allows a quick check of system accuracy, and front-panel, screwdriver-set calibration controls are available. Front-panel dc balance controls are provided on the 8801A. This unit features an output phone jack for the monitoring of the input signal by other devices without additional signal loading, or when the preamplifier is used separately from the recorder as a bench-top unit (option 001 is the case and power supply for separate use). The units may be operated directly from the output of Hewlett-Packard linear velocity and linear displacement transducers, or with other transducers using dc excitation. The 8808A logarithmic preamplifier is an average detecting logarithmic converter. It is calibrated in decibels where zero dB is taken as 1 V rms at the input. The unit can operate over a 50-dB or 100-dB span allowing signals from 100  $\mu$ V to 1 V rms to be recorded without changing ranges.

1.4.2.9.10 Dual trace oscilloscope. The rack mounted Tetronix R7603, oscilloscope, provides a wide performance range through plug-in and main-frame versatility. The cathode ray tube (CRT) in this oscilloscope is a large 8- by 10-inch division screen (1.22 cm/div). It features an internal graticule with variable illumination and 15-kV accelerating potential. An optional maximum brightness CRT with a smaller 8- by 10-cm display and 18-kV potential affords increased visual brightness and photographic writing speed. Plug-ins are available to make virtually any measurement desired. Examples are as follows:

525-MHz direct counter	1.8-GHz spectrum analyzer	Sampling to 14 GHz
Digital multimeter	1 mA/div current amplifier	Differential comparator
45-picosecond rise time time domain reflectometer	10 $\mu$ V/div differential	Curve tracer
Digital delay	Universal counter/timer	Delay line
Dual time base	Single trace	
Delayed sweep	Dual trace	

Single time base

Multitrace combinations

Mixed sweep

1.4.2.9.11 X-Y recorder. The HP, model 7035B, is a low cost, solid-state X-Y recorder for general purpose applications. Each axis has an independent servo system with no interaction between channels. The recorder graphs two related functions from two dc signals representing the functions. The ultracompact design is convertible to rack mounting by addition of two wing brackets which are supplied. Metric scaling and calibration are optional. The input terminals accept either open wires or plug-type connectors. Five calibrated ranges from 1 mV/inch to 10 V/inch are provided in each axis. A variable range control permits scaling of signal for full scale deflection. Standard features include high input impedance (1 megohm on all but the first two ranges), floated and guarded signal pair input, 0.2 percent accuracy, autogrip electric paper holddown, electric pen lift, adjustable zero set, lockable zero and variable range controls, and rear input connector. A plug-in time base, model 17108A, operates on either axis to provide five sweep speeds from 0.5 to 50 sec/inch. Each closed-loop servo system employs a high-gain solid-state servo amplifier, Hewlett-Packard servo motor, long-life balance potentiometer, photochopper, low pass filter, guarded inputs precision attenuator, and balance circuit. Designed for easy maintenance, most components are mounted on a printed circuit board and accessible by removing only the rear cover. Both balance potentiometers are accessible for inspection or cleaning by removing a snap-on strip.

1.4.2.9.12 Speaker panel. The speaker panel is to be used to reproduce  $v_f$  from a line for monitoring purposes by patching any line to the front panel input jack or by connecting any line to the terminal strip on the back panel. The speaker panel comprises two amplifier circuits and two speakers. The assembly is mounted in a standard 19-inch rack. It is 5.219 inches high and 6 inches deep. The speaker panel consists of a front panel with grill work for the speakers, power on/off switch, power indicator lamp, standard tip-ring-sleeve-type input jacks (which will accept the WE-310 plug), a fuse holder and fuse to protect the power input, gain control knobs for varying the listening levels, and switches for controlling the operation of input transformers (input impedance 600 ohms to 20 K ohms) which provide the capability of monitoring 600-ohm balanced lines while fully isolated from ground. The speaker panel also contains a rear panel (5.135 inches wide) with barrier-type terminal strips (two terminals each) which allows for all external connections (48 Vdc ground and input). Power outputs per channel (to 45-ohm speaker): 2 watts with input -10 dBm at 600 ohms, 5 watts less than 3 percent

total harmonic distortion; input impedance switchable balanced line: greater than 20 K ohm or 600 ohm; frequency response 200 Hz to 15 kHz at 2 watts output; input power 48 V dc  $\pm$ 5 V at less than 400 mA with both channels excited to 2 watts. Reference USACEEIA Specification, CCC-75061.

1.4.2.10 Fuse and alarm bay. One alarm bay will be required at each technical control facility. However, this bay may range from one alarm panel to several, depending on the size of the station and the alarm circuits required. Fuse panels are also required for the technical control facility, and like alarm panels, the quantity of panels depends on the size of the technical control facility and the fusing requirements. Common practice is to combine the fuse and alarm panels into a single bay to conserve space. They may also be mounted in several bays depending on requirements. The fuse and alarm bay is the point from which branch fusing is performed for each individual circuit requiring 48 Vdc. It is also the point where all alarms are visually displayed. The fuse alarm bay should be located in visual range of the technical controller or the shift supervisor. A typical bay elevation is shown in figure 1-28.

1.4.2.10.1 Distribution fuse panel. The recommended fuse panel is the SB-1523/FT or equal. The SB-1523 fuse and alarm panel provides individual circuit fuse facilities for up to 24 circuits from a common battery supply. A fuse alarm circuit is included which lights an alarm lamp on the panel and provides dry relay contacts for connection into an office alarm system. The panel comes complete with all internal wiring connected to the unit terminal strip and all component parts wired and connected in place. The required external wiring connections are made to a screw-type terminal strip on the rear of the SB-1523. Main battery connections are made to solderless connectors at the rear of the front panel inside the rear panel. The SB-1523/FT is shown in figure 1-29, sheets 1 and 2. Fuse requirements depend on circuit requirements, but are available in amperage ratings of 1-1/3, 3, and 5 amperes. Grasshopper-type fuses are used. These fuses provide a visible signal and activate an alarm circuit when blown. For quick identification of a circuit in trouble, when a fuse blows, the indicator spring rises well above the insulator bar and a sharp spur on the alarm spring makes positive contact on the alarm. A color code is used on the insulated bar to indicate type and amperage of fuse.

1.4.2.10.2 Alarm display panels. The alarm display panel USACEEIA Specification, CCC-75051, is recommended for use in the technical control facility. These panels are designed to operate

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45 40 35 30 25 20 15 10 5 0	MATERIAL LIST ITEM	GFE	CFE
45	BLANK PANEL		
	ALARM DISPLAY PANEL CCC-75051		
	ALARM DISPLAY PANEL CCC-75051		
40	ALARM DISPLAY PANEL CCC-75051		
	FUSE DISTRIBUTION PANEL SB-1523/FT		
35	FUSE DISTRIBUTION PANEL SB-1523/FT		
	FUSE DISTRIBUTION PANEL SB-1523/FT		
30	FUSE DISTRIBUTION PANEL SB-1523/FT		
	BLANK PANEL		
25	BLANK PANEL		
	BLANK PANEL		
20	BLANK PANEL		
	BLANK PANEL		
15	BLANK PANEL		
	BLANK PANEL		
10	BLANK PANEL		
	BLANK PANEL		
5	BLANK PANEL		
	BLANK PANEL		
0	BLANK PANEL		

Figure 1-28. Fuse and alarm bay.

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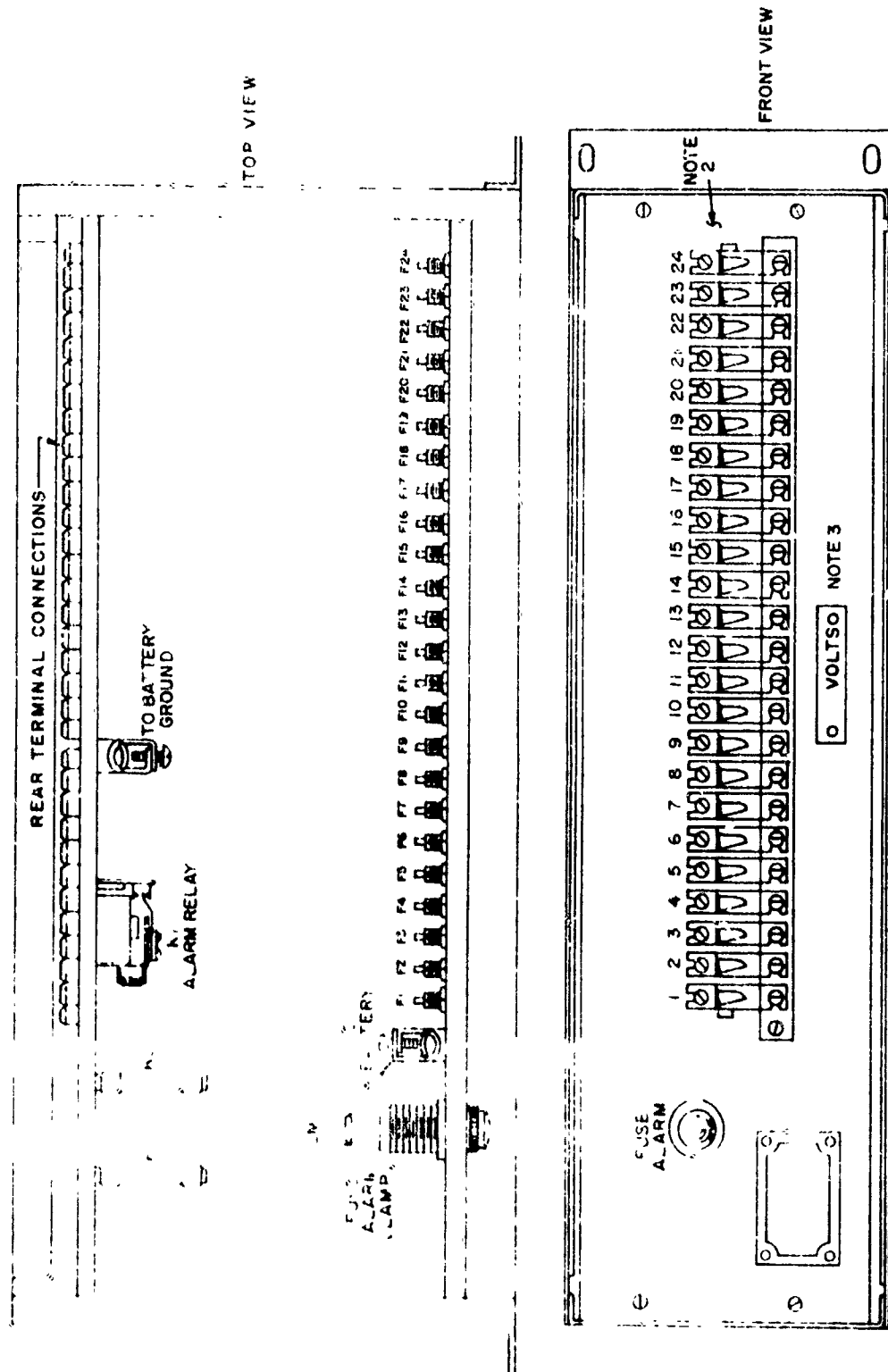
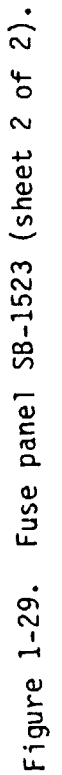


Figure 1-29. Fuse panel SB-1523 (sheet 1 of 2).

- 1-57



from the 48 Vdc power. To cause an alarm condition, a ground is required from the troubled circuit. The ground activates a relay which in turn lights a lamp on the front panel, activates the internal audible alarm, and applies a ground to pin 91 to the connector on the rear panel. This ground then can be used to activate an external audible alarm. A push-to-test switch is provided on the front panel. The alarm panel offers 45 major or minor alarm displays. Once an alarm circuit has been activated, the lamp lights and the external audible alarm sounds. The audible alarm can be silenced by pushing the lighted lamp. The lamp, however, will remain illuminated until the ground is removed from the activated circuit. The schematic for the alarm display panel is shown in figure 1-30. An external alarm may also be used. A ground is provided on pin 91 for this purpose.

1.4.2.11 Status reporting console. A status reporting console may or may not be required. The status reporting console is the coordination center for the technical control facility. It is the point where the records are maintained and stored and serves as the shift supervisor's office. The console may be configured in any suitable configuration but must satisfy the requirements of the facility. The console discussed here and shown in figure 1-31 will satisfy the requirements of a medium-size technical control facility. The recommended equipment for the console is a meter panel assembly, an orderwire panel if required, ac outlets, and drawer space. The following factor should be considered in determining the requirement of a status reporting console:

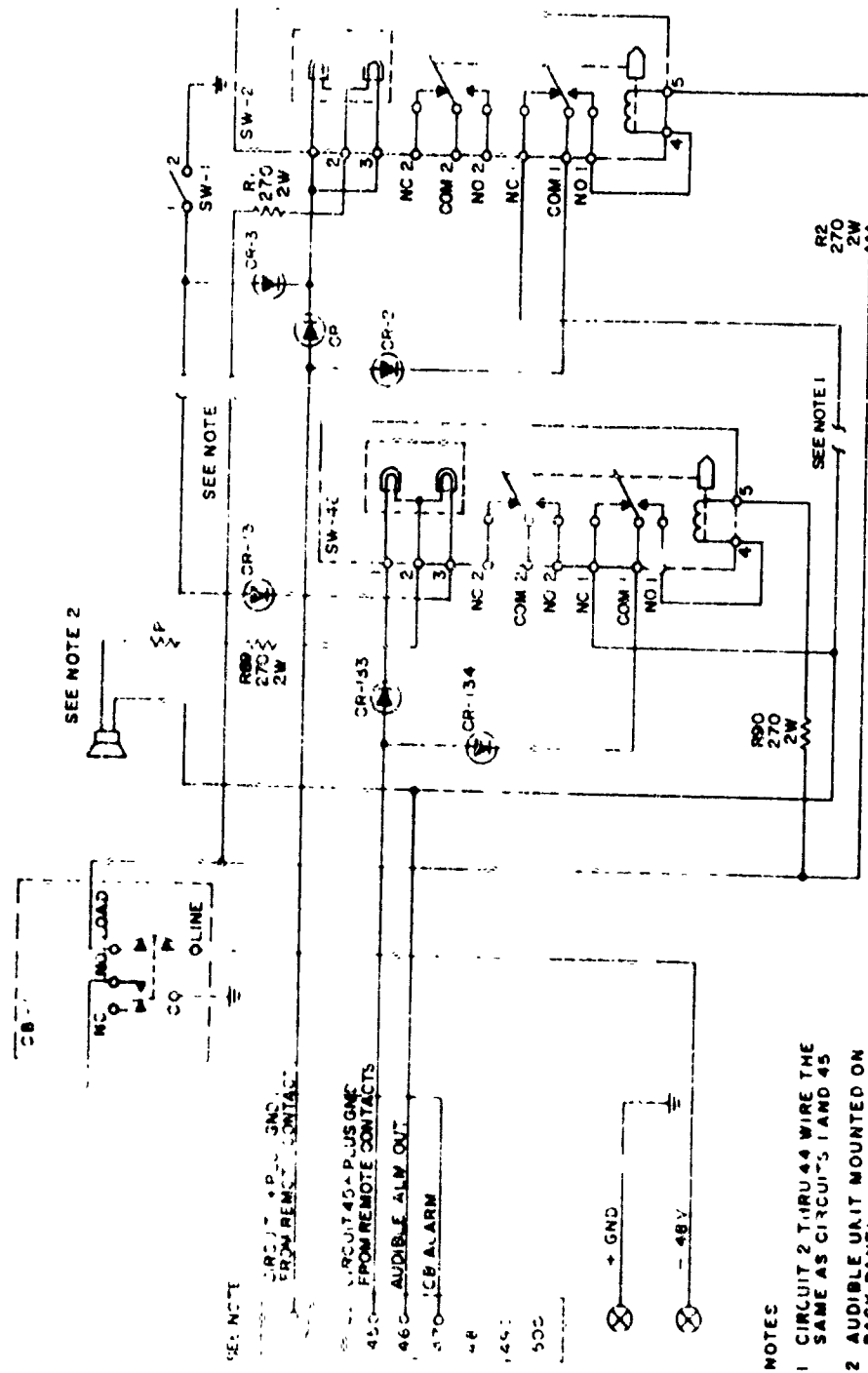
- a. Filing of circuit cards.
- b. Quantity of technical service orders stored.
- c. Filing of equipment records.
- d. Number of personnel assigned to each shift.
- e. Orderwire access and power monitoring capabilities for the shift supervisor.

1.4.2.11.1 Meter panel. This panel shall contain a frequency meter (50 or 60 Hz must be specified) and a 48-Vdc voltmeter. The panel is used to monitor the ac line frequency and to monitor the 48-Vdc power system.



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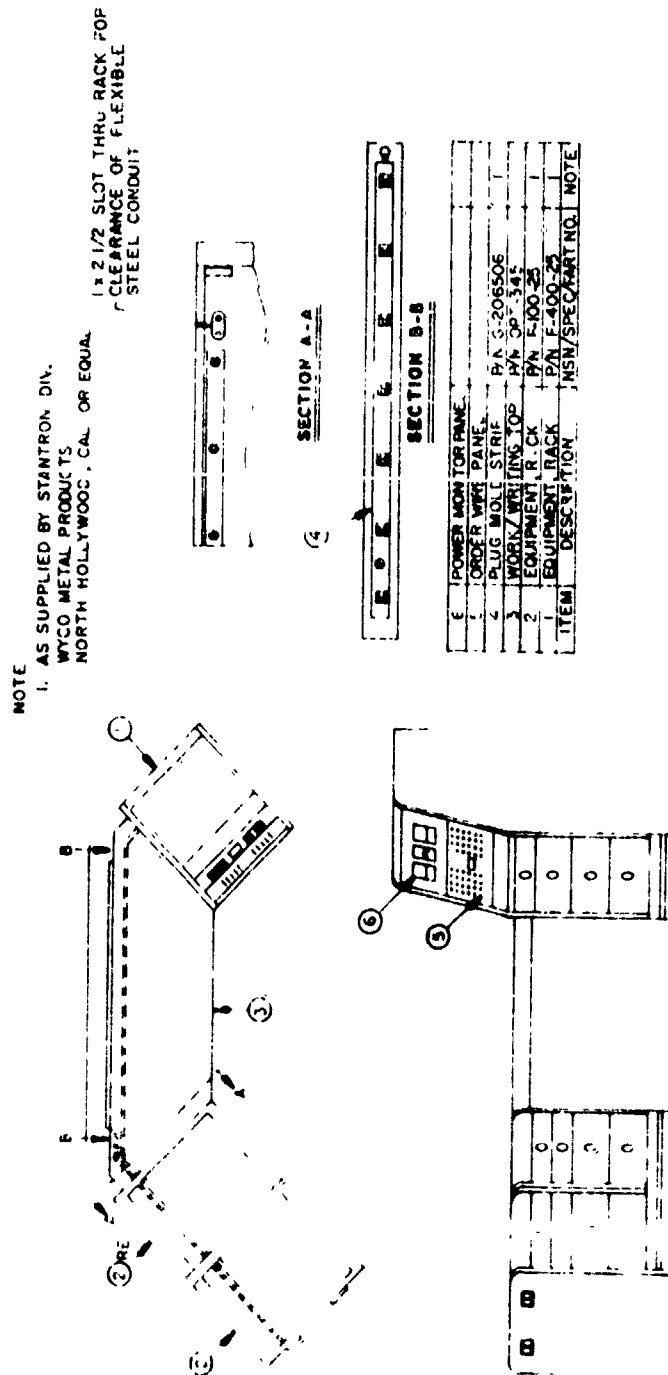


Figure 1-31. Status reporting console.

1.4.2.11.2 Orderwire panel. An operator's access orderwire unit may be located in the console for use by the shift supervisor. Information on the orderwire system is contained in paragraph 1.4.2.12.

1.4.2.11.3 Alternating current outlets. The console contains an ac plug-in strip across the front to provide power to portable typewriters, time and date stamp, and other small ac-powered items.

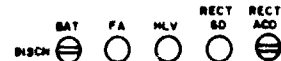
1.4.2.11.4 Drawers. Drawers may be selected with any height, but the front panel space should equal 21 inches on the F-100-25 frames and 24-1/2 inches vertical and 17-1/2 inches sloping on the F-400-35 frames. The drawers are available in panel heights of 3-1/2 inches, 7 inches, 8-3/4 inches, 10-1/2 inches, and 14 inches and may be 18-5/8 inches, 22-1/8 inches, or 25-5/8 inches deep.

1.4.2.12 Orderwire/Intercommunication. Orderwire equipments presently installed are to be replaced with new state-of-the-art equipment. Also new functions that require additional equipment are being added to the orderwire system. The descriptions/functions of some of these equipments are not available at this time. This paragraph is therefore left blank and will be provided at a later date.

1.4.2.13 Power system (48 Vdc). A 48-Vdc power system is normally required at all technical control facilities but may not be required at certain PTF's. The determining factor is the equipment requiring 48-Vdc operating power. This 48-Vdc power system may range from a few amperes to several hundred amperes and will be sized according to the requirements of the station. The 48-Vdc power system may contain any or all of the following items: 48-V rectifiers or chargers, 48-V battery bank, power distribution board, counter electromotive force (CEMF) cells and power filters. The location should be chosen for shortest cable runs and space available. The distance between charger and battery or between rectifier and distribution bay should not exceed 50 feet. The system should be sized according to the site requirements. Elevation drawings of a recommended system is shown in figure 1-32. The system can be obtained from Lorain Power Company with the exception of the battery bank which is available from C&D Battery Company. The Lorain equipment can be procured by one part number, 5822-027, list 1-8. The system is available in 50-, 100-, 200-, and 400-ampere capacity. Refer to the dc power drawings in section 4 for battery sizing, and to SEIP 020 for detailed power system requirements.

1.4.2.13.1 Rectifiers or chargers (48-Vac-48-Vdc). The power supplies shall be in accordance with USACEITA Specification, CCC-75064, and shall be sized so that each unit will supply full station power including charging current to the battery bank. Redundant supplies will be installed to allow for failures. In specifying the type

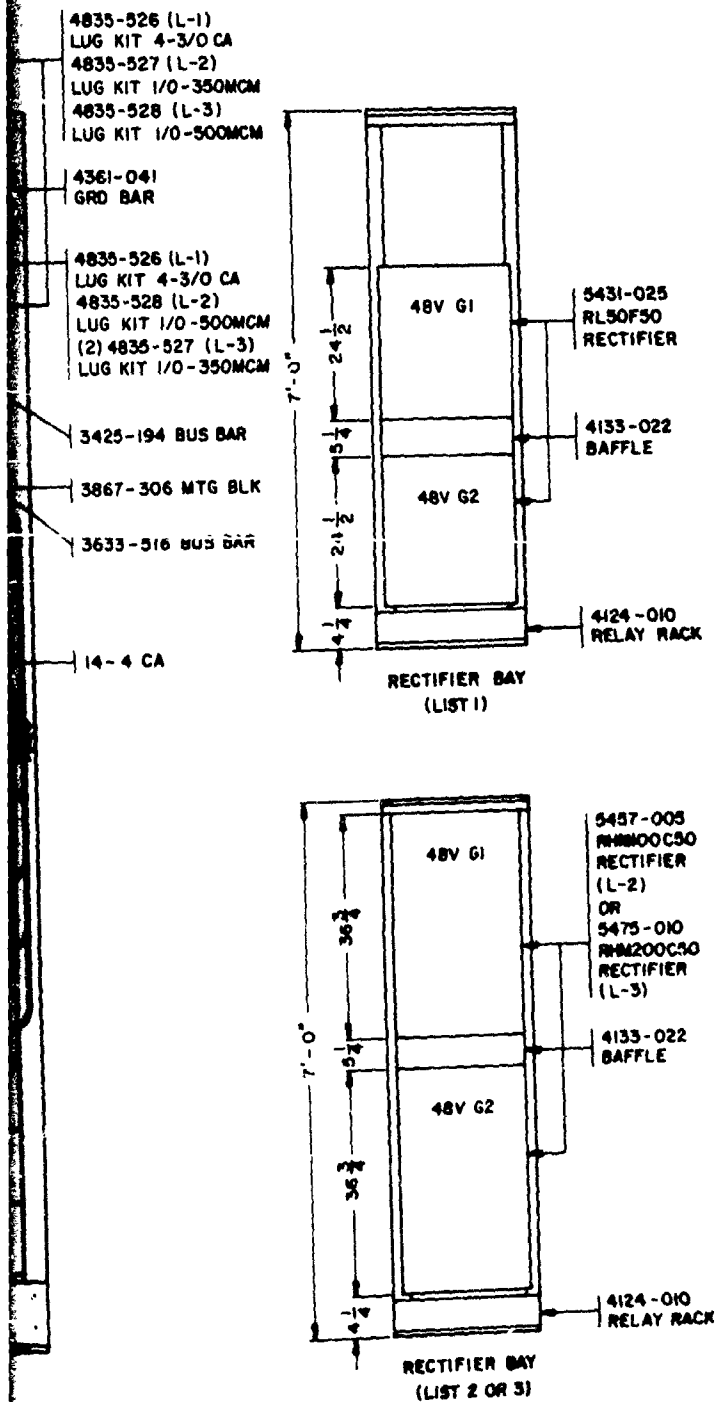
4835-523	4835-526
LUG KIT	LUG KIT
4-14 CA	4-3/0 CA



REG	YGT	YCR	(4)	VAR	VM	A	B	(5)
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
SA	1/3A	1-1/3A		1-1/3A		1-1/3A		

LAMP, KEY & FUSE ARE

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000

	(1)	(2)	(3)	(4)
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

ARRANGEMENT

Figure 1-32. 48V dc power system.

power supply to be used, consideration shall be given to ac input voltage and frequency and rack or floor mounted units.

1.4.2.13.2 Power distribution bay. The power distribution bay USACEEIA Specification, CCC-75065, consists of a voltmeter, current meter, alarms for high and low voltage, fused distribution panels, CEMF, and ground bar. Current ratings and the quantity and amperage of the distribution fuses required should be considered when ordering. This bay is an intermediate fusing point in that the LCE bays have distribution fuse panels and the test equipment and miscellaneous panels are fused from the SB-1523/FT discussed in paragraph 1.4.2.10. This bay is generally located near the power supplies.

1.4.2.13.3 Battery bank. The battery bank will be configured and sized to the requirements of the site.

1.4.2.13.4 Counter electromotive force cells. A CEMF cell will be required in technical control facilities that are equipped with battery banks. One 3-V CEMF cell is recommended and should be the dry-type. The cell will be in line during battery equalize, and shorted out during the float stage.

1.4.2.14 Power system (alternating current). An ac power system is required at all technical control facilities/PTF's regardless of size. The power system will be sized and equipped as described in MIL-HDBK-411. The amount and class of power required at facilities is determined by the degree of reliabilities dictated by strategic and operational considerations. The type and size of the ac power system varies greatly for each technical control facility. It is recommended that the ac power system be designed according to MIL-HDBK-411.

## 1.5 WIDEBAND EQUIPMENT REQUIREMENTS.

1.5.1 General. Facilities for monitoring, testing, and patching of wideband analog and hi-speed ( $> 1$  mb/s) digital circuits will be included where a requirement exists for their use. All technical control facilities will provide patch panel appearances for the first level of multiplexing; whereas, the output of the second level of multiplexing (input to radio) shall be provided after the following considerations:

a. Does the mux/radio contain built-in capabilities for patching, monitoring, and testing?

b. Is there a bonafied need for rerouting baseband circuits?

c. Could wideband interbay patch panels be used to satisfy re-route requirements?

d. Could the wideband patching facilities result in electromagnetic compatibility (EMC) problems?

1.5.1.1 An agreement between DCEC and the triservices has added new designations to the patch bays for data circuits. For a discussion on each of these patch bays as well as for analog, (see figure 1-33). The equipment rack is discussed in paragraph 1.4.2.1.1. The various functional blocks of the PTF are discussed in the following paragraphs:

- a. Group patch, mux-demux FDM.
- b. Supergroup patch, mux-demux FDM.
- c. Baseband patch FDM.
- d. Megabit patch first level time division multiplexing (TDM).
- e. Multimegabit patch second level TDM.
- f. Analog-digital/digital-analog conversion.

#### 1.5.2 Equipment description.

1.5.2.1 Group patch, multiplex-demultiplex frequency division multiplex. This functional block of the PTF shows the provision for patching, altrouting, monitoring, and testing of the group FDM signal. It interfaces the channel bank equipment of the group mux/demux to the group equipment. Twelve 4-kHz vf channels are multiplexed into one 48-kHz bandwidth group signal with a frequency of 60 to 108 kHz. Through group conditioning is done at this point for through group connectivities. Tests required by DCAC-310-70-1 for group signals are performed at this location. The group PTF may or may not be located in the operations area of the technical control facility. Elevation of the group, supergroup, and baseband patch bay is shown in figure 1-34.

1.5.2.2 Supergroup patch multiplex-demultiplex frequency division multiplex. This functional block of the PTF shows the provision for the patching, altrouting, monitoring, and testing of the supergroup signals. It interfaces the group mux equipment to the supergroup mux equipment. Five 48-kHz bandwidth group signals at 60 to 108 kHz are multiplexed into one 240-kHz bandwidth signal at 312 to 552 kHz. For a more detailed discussion of the bandwidth and frequencies for various channel capacities, see MIL-STD-188-311. Through supergroup conditioning is performed at this position for through supergroup

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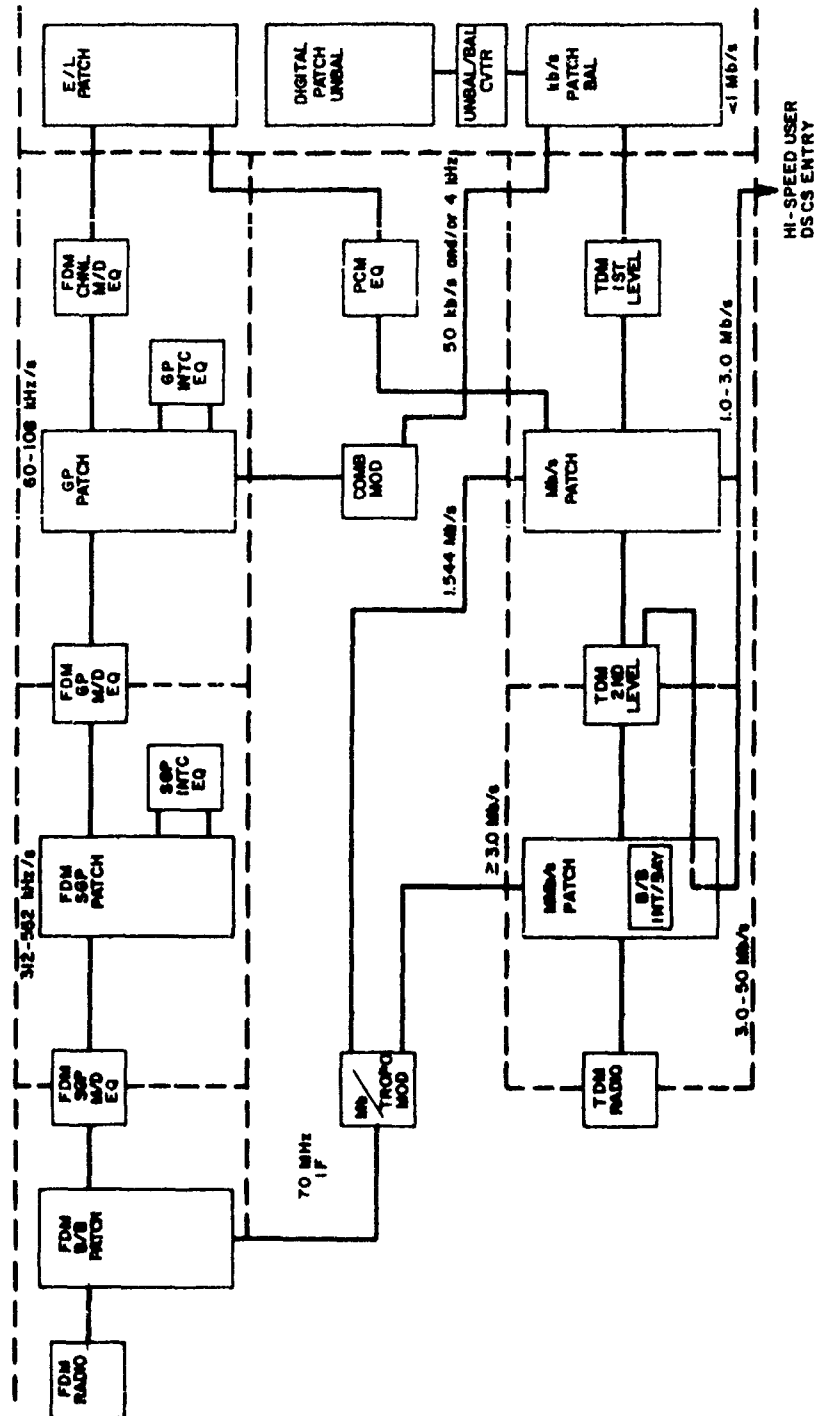
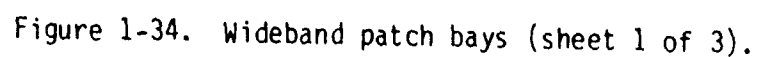


Figure 1-33. Patch and test facility TDM LOS DCS.





GROUP PATCH		QTY	MATERIAL LIST ITEM	GFE	CFE
45	BLANK PANEL	1	EQUIPMENT RACK CCC-75050		
	BLANK PANEL	5	TWINAXIAL PANEL CCC-75071		
40	BLANK PANEL	2	TWINAXIAL PANEL W/O MONITOR CCC-75076		
35	GROUP PATCH	1	INERBAY PANEL CCC-75074		
	TWINAXIAL PANEL	1	MISC PANEL CCC-75073		
30	W/ MONITOR	1	WRITING SHELF ENCOR RS-18A		
	AUXILIARY PATCH TWINAXIAL PANEL W/O MONITOR	3	GROUP INTERCONNECT EQUIPMENT		
25	INTERBAY PATCH	1	GROUP CONDITIONING EQUIPMENT		
	MISC PANEL	1	BLANK PANEL 1 3/4" ENCOR PNA-1		
20	BLANK PANEL	1	BLANK PANEL 3 1/2" ENCOR PNA-3		
	WRITING SHELF	1	BLANK PANEL 7" ENCOR PNA-7		
15	GROUP INTERCONNECT EQUIPMENT	1	BLANK PANEL 8 3/4" ENCOR PNA-8		
	GROUP INTERCONNECT EQUIPMENT				
10	GROUP INTERCONNECT EQUIPMENT				
	GROUP INTERCONNECT EQUIPMENT				
5	GROUP CONDITIONING EQUIPMENT				
4	BLANK PANEL				
3					
2					
1					
0					

Figure 1-34. Wideband patch bays (sheet 2 of 3).

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SUPERGROUP 8 88 PATCH					
		QTY	MATERIAL LIST ITEM	GFE	CFE
45	BLANK PANEL				
	BLANK PANEL	1	EQUIPMENT RACK CCC-75050		
40	BLANK PANEL	4	COAXIAL W/MONITOR CCC-75072		
	BLANK PANEL	4	COAXIAL W/O MONITOR CCC-75077		
35	BLANK PANEL	1	INTERBAY PANEL CCC-75074		
	SUPERGROUP PATCH COAXIAL W/ MONITOR	1	MISC PANEL CCC-75073		
30	SUPERGROUP PATCH COAXIAL W/ MONITOR	1	WRITING SHELF EMCOR RS-18A		
	SUPERGROUP PATCH COAXIAL W/ MONITOR	1	SUPERGROUP INTERCONNECT EQUIPMENT		
	BASEBAND PATCH	2	SUPERGROUP CONDITIONING EQUIPMENT		
25	AUXILIARY PATCH COAXIAL W/O MONITOR	1	BASEBAND CONDITIONING EQUIPMENT		
	AUXILIARY PATCH COAXIAL W/O MONITOR	1	BLANK PANEL 1 3/4" EMCOR PNA-1		
20	INTERBAY PANEL	2	BLANK PANEL 3 1/2" EMCOR PNA-3		
	MISC PANEL	1	BLANK PANEL 7" EMCOR PNA 7		
	BLANK PANEL	1	BLANK PANEL 8 3/4" EMCOR PNA 8		
15	WRITING SHELF				
	SUPERGROUP INTERCONNECT EQUIPMENT				
10	SUPERGROUP CONDITIONING EQUIPMENT				
	SUPERGROUP CONDITIONING EQUIPMENT				
5	BASEBAND CONDITIONING EQUIPMENT				
4	BASEBAND CONDITIONING EQUIPMENT				
3	BASEBAND CONDITIONING EQUIPMENT				
1	BLANK PANEL				
0					

Figure 1-34. Wideband patch bays (sheet 3 of 3).

connectivities. Test equipment required to perform test required by DCAC 310-70-1 will be located at this position. The supergroup patch may or may not be located in the technical control facility operations area.

1.5.2.3 Baseband patch, frequency division multiplex. This functional block of the PTF diagram shows the provisions for testing, monitoring, and altrouting the baseband signals. This system will be installed in facilities that require alternate routes for the baseband signals. For a discussion on the baseband bandwidth and frequencies versus channel capacities, see MIL-STD-188-313. Tests required by DCAC 310-70-1 for the baseband signal may be conducted at this point. This panel may or may not be located in the technical control facility operations area.

1.5.2.4 Megabit patch first level time division multiplex. This functional block of the PTF shows the provision for the patch, altrouting, monitoring, and testing of the medium-speed digital signals. It provides the interface between the first and second level mux/demux. It also interfaces the medium-speed users to the PTF. This functional block of the PTF has been designated megabit patch and test area, and may or may not be located in the technical control facility operations area. Data rates of 1.0 to 3.0 Mb/s will be tested and controlled at this position.

1.5.2.5 Multimegabit patch second level time division multiplex. This functional block of the PTF shows the provisions for the patching, altrouting, monitoring, and testing of high-speed circuits in the PTF. This function interfaces the high-speed user and the satellite terminal to the second level digital mux. Data rates of 3.0 to 50 Mb/s will be tested and controlled at this position. The baseband signal from/to the second level mux and radio will normally bypass the multi-Mb/s patch. A system of interbay panels and cables designated baseband interbay will be installed in facilities that have the capability and requirement for altrouting the digital baseband. The interbay panel will be located in or near (patch cord distance) to the baseband access point on the mux or radio. Upon failure of baseband equipment, altrouting will be performed via the interbay cable system. This functional block has been designated multi-Mb/s patch and test, and may or may not be located in the technical control facility operations area.

1.5.2.6 Analog-digital/digital-analog conversion. This function of the PTF performs the conversion between the FDM and TDM equipment. The functional block designated pulse code modulation (PCM) equipment will accept several voice channels from the technical control facility and convert them to a medium-speed digital bit stream. The next

functional block has been designated wideband analog-digital converter. The function of this equipment will accept one 50-kb/s data and one 4-kHz voice and combine them into an analog signal equal to a FDM group. The next functional block designated mb/s tropo modulation demodulation equipment (MODEM) interfaces a FDM supergroup signal and a high-speed digital signal.

#### 1.5.2.7 Wideband and high-speed patch panels and jacks.

1.5.2.7.1 Wideband analog patch panels. The recommended patch panel for wideband operation is USACEEIA Specification, CCC-75072, for coax and USACEEIA Specification, CCC-75071, for twinaxial patching. A typical panel is shown in figure 1-35. The panel contains 20 self-normalizing, self-terminating jacks accommodating 10 FDX circuits. Each jack circuit has an associated monitor jack.

1.5.2.7.2 Auxiliary patch panel. The auxiliary panel contains 20 normally terminated jacks. The auxiliary panel provides termination into the proper impedance of 40 independent equipment access lines. The recommended patch panel is USACEEIA Specification, CCC-75073, for coax or twinaxial.

1.5.2.7.3 Miscellaneous interbay patch panels. The miscellaneous and/or interbay patch panel (fig. 1-36) used in the wideband area should be arranged with a combination of the various jacks discussed in paragraph 1.5.2.7.5. The panels will be arranged differently for each site because of the difference in site requirements. It is also possible more than one panel would be required; a miscellaneous and interbay patching schematic is shown in section 4.

1.5.2.7.4 Wideband patch jacks. The suggested jacks for use in the wideband area are discussed below. These jacks are used in the panels recommended throughout this section.

1.5.2.7.5 Coax and twinax terminating and switching jacks. The input and output line will be connected by the BNC-type connectors (coax or twinax). The jacks will be constructed so that a coax-type patch cord will mate with all coax-type jacks and twinax-type patch cords will mate with all twinax type jacks. Descriptions of the six types follow:

a. Type 1. This jack will be used as a normal-through, self-terminating coaxial jack with 75 ohms terminating impedance. The operations required are given in figure 1-37, sheet 1, A through D. An equivalent jack is Cooke Engineering Company, type 22T. This jack will normally be used in the baseband or supergroup patch panel.

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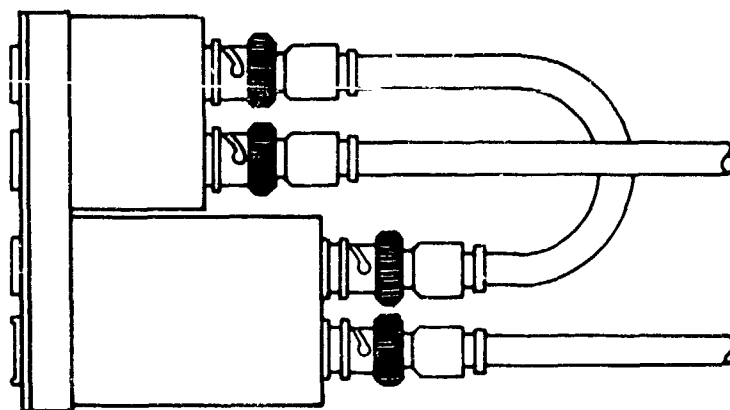
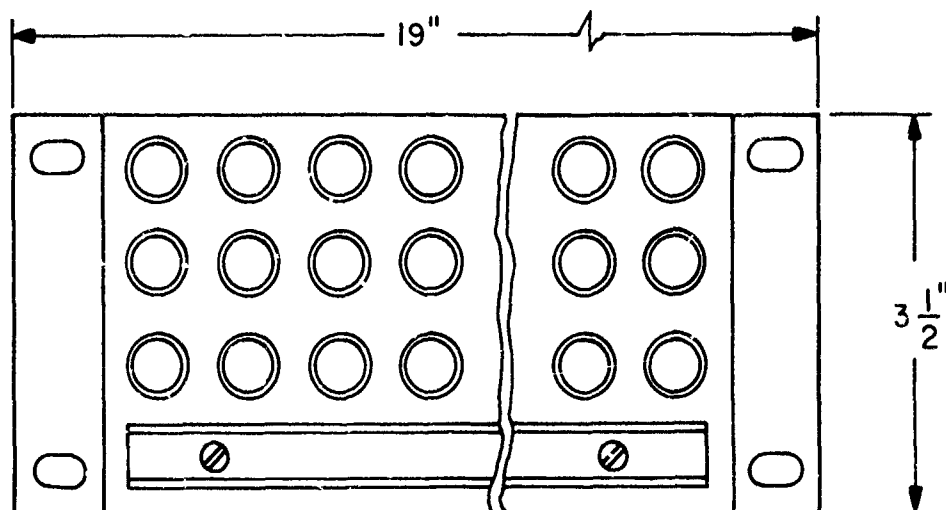


Figure 1-35. Wideband patch panel assembly, USACEEIA  
Specifications CCC-75071 and CCC-75072.

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3	JACK, AUDIO P/N JJ-042		16	
2	JACK, COAX, P/N 22 T		3	
1	JACK, TWINAX P/N 20 T		10	
ITEM	DESCRIPTION	NSN	QTY	NOTE
CEEIA SPEC. CCC-75076 MISCELLANEOUS PATCH PANEL				

4	JACK, LAMP SOCKET P/J-157		8	
3	JACK, AUDIO P/N CMT-336B		8	
2	JACK, COAX, P/N 2-2A		3	
1	JACK, TWINAX, P/N 20A		10	
ITEM	DESCRIPTION	NSN	QTY	NOTE
CEEIA SPEC. CCC-75077 INTERBAY PATCH PANEL				

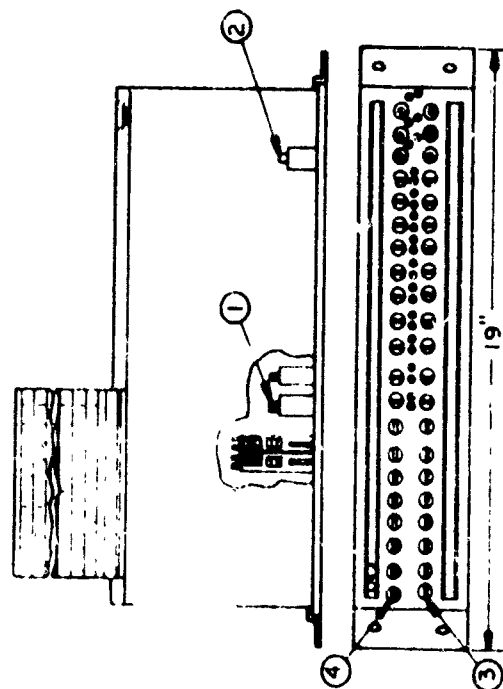


Figure i-36. Miscellaneous and interbay patch panel.

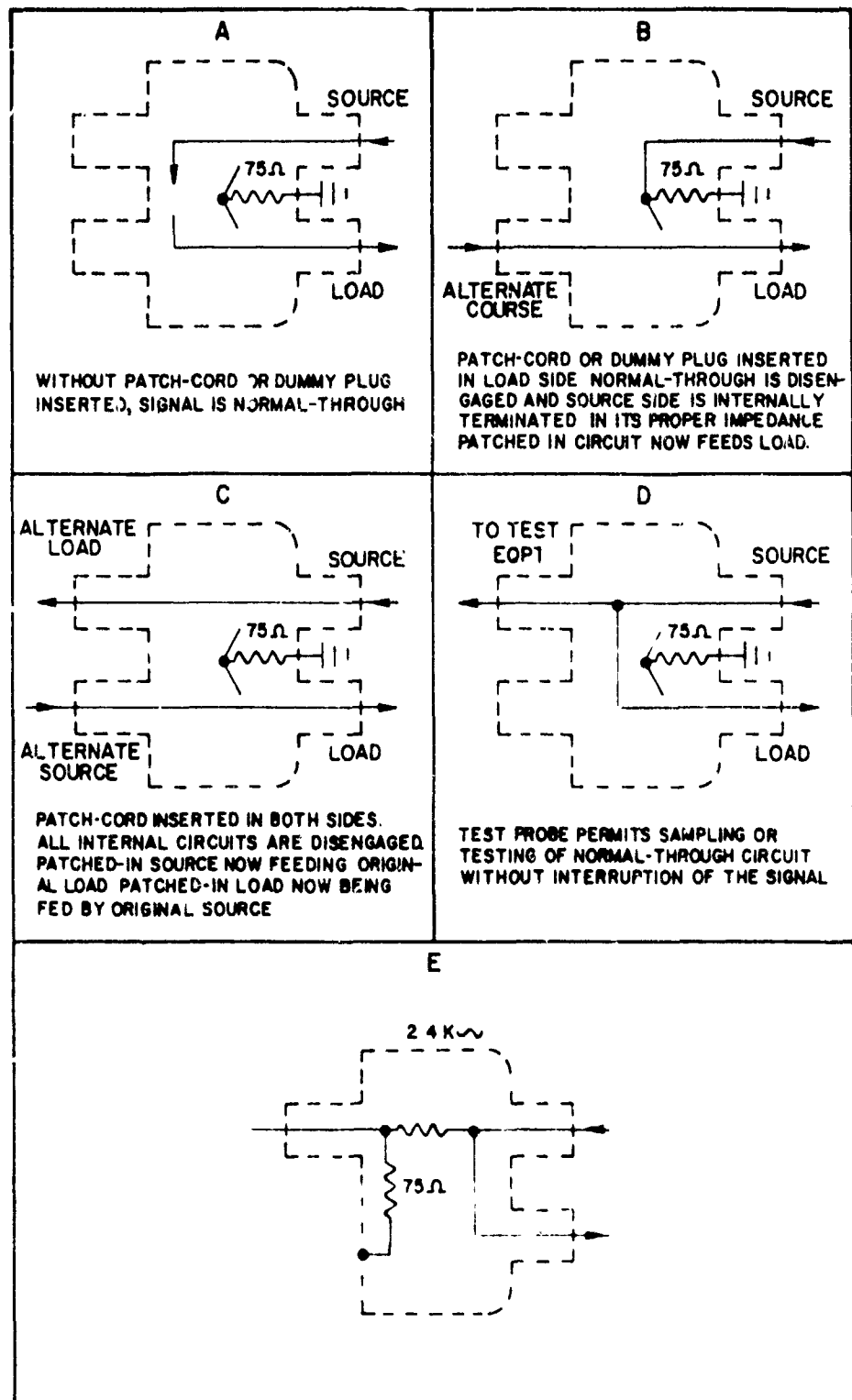


Figure 1-37. Wideband patch jack modules (sheet 1 of 3).



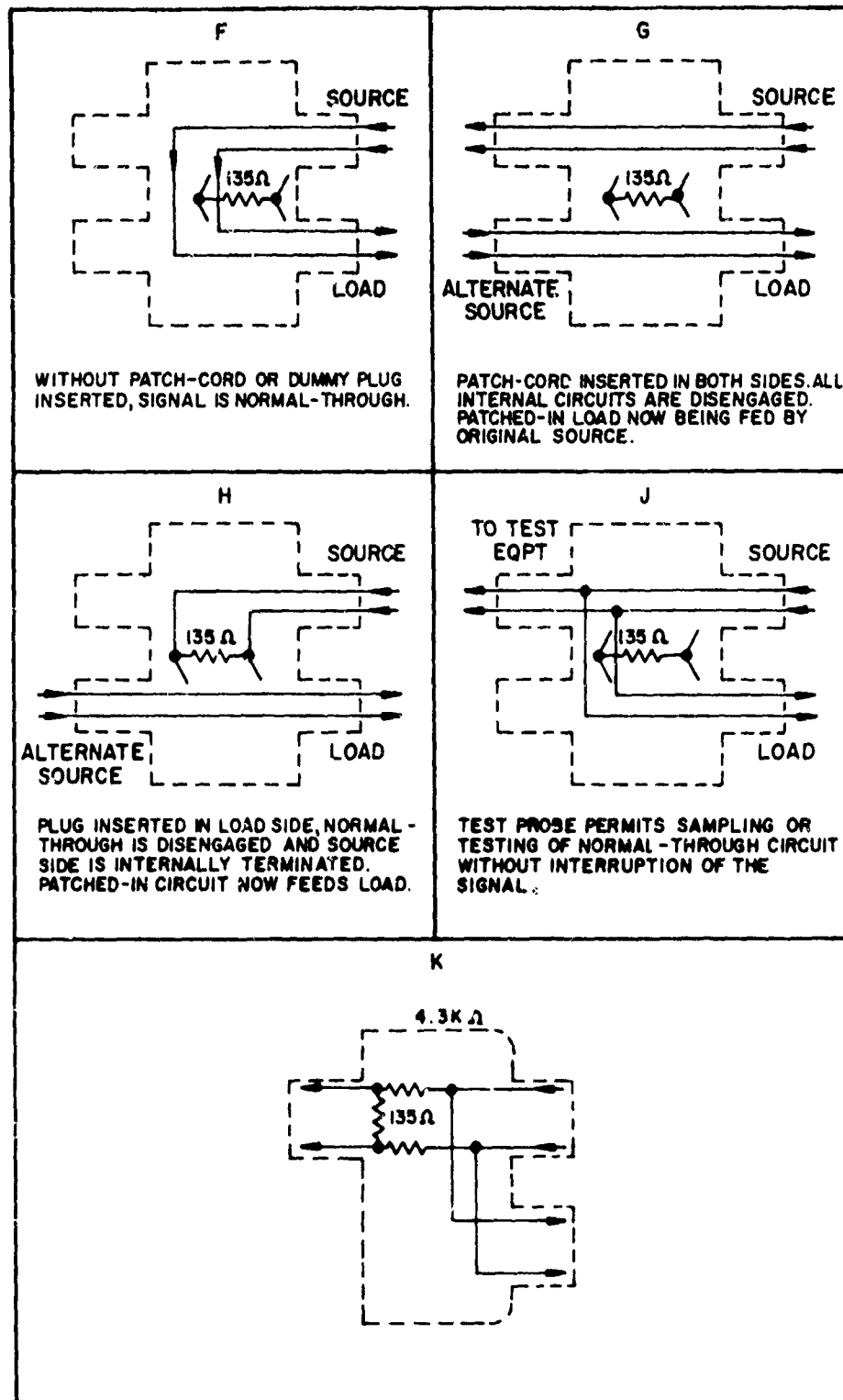


Figure 1-37. Wideband patch jack modules (sheet 2 of 3).

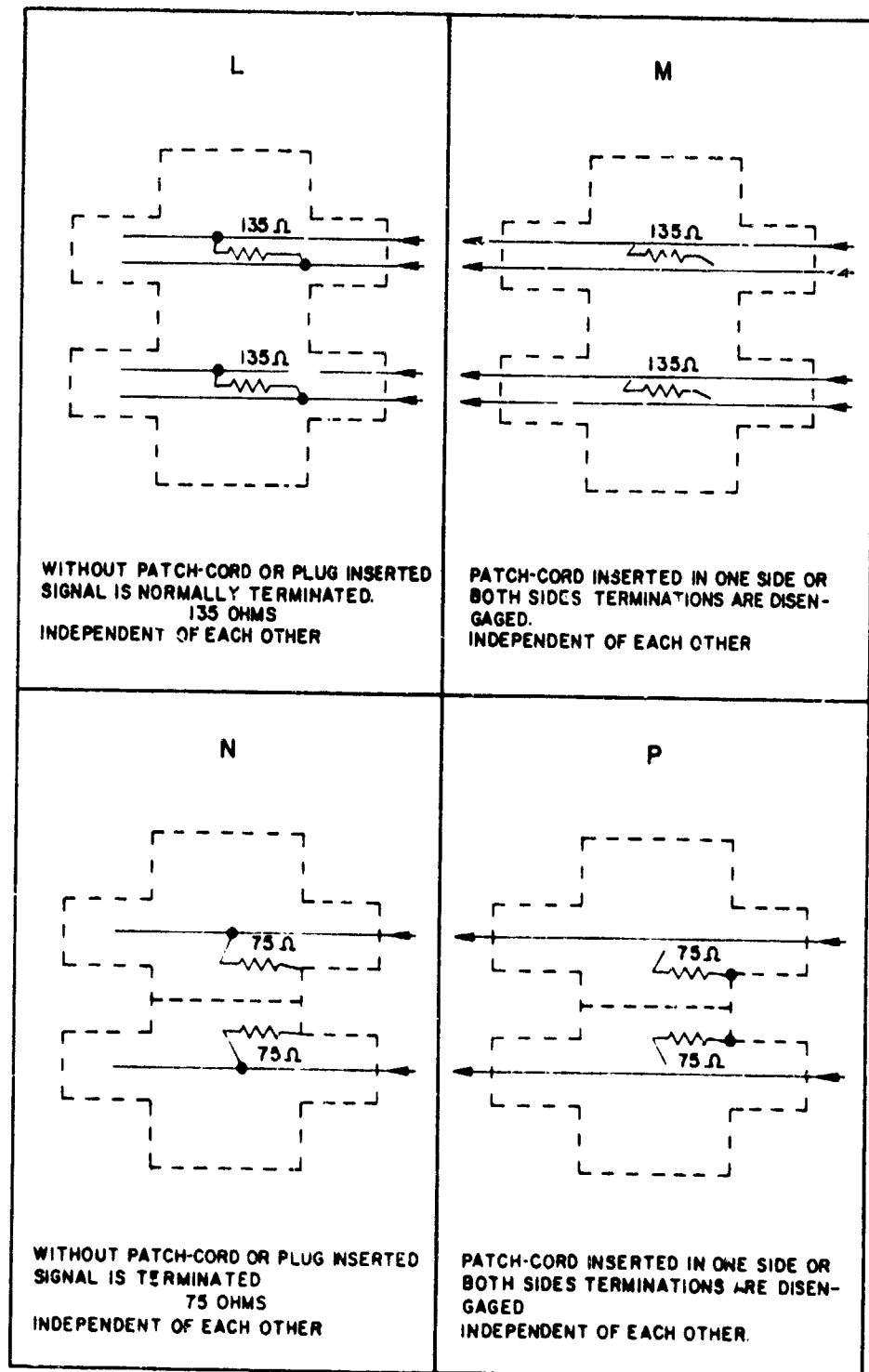


Figure 1-37. Wideband patch jack modules (sheet 3 of 3).

b. Type 2. This jack is to be used in conjunction with the type 1 jack to provide monitoring of the circuit and 30 dB isolation between the circuit and monitoring device, arranged as shown in figure 1-37. An equivalent jack is Cooke Engineering Company, type 22M.

c. Type 3. This jack will be used in a twinaxial circuit. It will be a normal-through and self-terminating with 135 ohms terminating impedance. The functions required are shown in figure 1-37, sheet 2, F through J. An equivalent is Cooke Engineering Company, type 20T. This jack will normally be used in the group patch panel.

d. Type 4. This jack will be used in conjunction with type 3 to provide monitoring of the circuit and 30-dB isolation between the circuit and monitoring device. Functional requirements are given in figure 1-37, sheet 2. Equivalent jack is Cooke Engineering Company, type 20M.

e. Type 5. This jack is to be used as a normally-terminated jack. Each section is independent of the others. This jack will provide a 135-ohm termination impedance to the connected circuit until the patch cord is inserted. Functional requirements are shown in figure 1-37, sheet 3, L through M. An equivalent jack is Cooke Engineering Company, type 20A. This jack will be used in the auxiliary, miscellaneous, and interbay patch panel.

f. Type 6. This jack is a coax-type, normally terminated, providing 75 ohms impedance to the connected circuit, removing termination when the patch cord is inserted. Functional requirements are shown in figure 1-37, sheet 3, N through P. An equivalent jack is Cooke Engineering Company, type 2-2A. This jack will be used in the auxiliary, miscellaneous, and interbay patch panel.

#### 1.5.2.8 Wideband analog test bay.

1.5.2.8.1 General. A wideband analog test bay may be required in the wideband PTF area. Factors to be considered in determining the requirement for wideband test bays are the quantity and type of circuits traversing the station. If both analog and digital mux or channel bank equipment are present, then two bays may be required, but on the other hand, if only one or two groups of analog are present and the wideband and narrowband PTF are in the same area, then the quality assurance bays could be used for testing of the wideband circuits and/or equipment. The following discussion assumes that both digital and analog test bays are required. It may be more convenient to provide the wideband test equipment in a mobile configuration. The analog test bay, USACEEIA Specification, CCC-75069, is configured as shown in figure 1-38. It should contain a white noise test set, rms voltmeter, strip-chart recorder, spectrum analyzer with a selective level voltmeter and a test oscillator, miscellaneous patch panel, and an interbay patch panel.

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45	BLANK PANEL	QTY	MATERIAL LIST ITEM	GFE	CFE
	BLANK PANEL				
40	WHITE NOISE TEST SET MARCONI OA-2090 AN/GSM-161	1	EQUIPMENT RACK CCC-75054		
		1	WHITE NOISE TEST SET MARCONI OA-2090		
35	RMS VOLTMETER HP-3400A AN/USM 224	1	RMS VOLTMETER HP 3400A		
	DUAL TRACE OSCILLOSCOPE TEKTRONIX R7603	1	DUAL TRACE OSCILLOSCOPE TEKTRONIX R7603		
30	SPECTRUM ANALYZER AND DISPLAY SIERRA 360B I P 1018	1	SPECTRUM ANALYZER SIERRA 360B		
25	SELECTIVE VOLTMETER SIERRA 120A FR 205U	1	SELECTIVE LEVEL VOLTMETER SIERRA 120A		
	BLANK PANEL	1	INTERBAY PANEL CCC-75074		
20	INTERBAY PANEL	1	MISC PANEL CCC-75073		
	MISC PANEL	1 *	WRITING SHELF EMCOR RS-10A		
15	* WRITING SHELF	1 *	TEST OSCILLATOR HP-652		
	TEST OSCILLATOR HP-652 AN/USM 264	1	BLANK PANEL 1 3/4" EMCOR PNA-1		
10	BLANK PANEL	4	BLANK PANEL 3 1/2" EMCOR PNA-3		
	BLANK PANEL				
5	BLANK PANEL				
4					
3					
2					
1	AC CONV				
0					

\* DENOTES OPTIONAL ITEM

Figure 1-38. Wideband analog test bay,  
USACEEIA Specification CCC-75069

1.5.2.8.2 White noise test set. The recommended white noise test set is the AN/USM-224 rack mounted or the Marconi, OA-2090R, or equal. This test set consists of a TF-2091R noise generator and a TF-2092R receiver. The OA-2090R permits the measurements of intermodulation products and noise in multichannels generated by the instrument and is used to simulate channels up to 2700. This signal is applied to the baseband circuit of the equipment under test and the noise in a narrow slot is compared in the loaded and unloaded status. The generator includes a selection of high and low pass filters to restrict the noise to the required bandwidth and band-stop filters to create a slot within the band. The receiver has a selection of narrowband-pass filters corresponding to the generator slots and a meter and attenuator to measure the relative noise level as the generator slot is switched in and out.

1.5.2.8.3 Root mean square voltmeter. The HP-3400 (AN/USM-224) is discussed in paragraph 1.4.2.9.1.

1.5.2.8.4 Strip chart recorder. The HP-7702 Strip Chart Recorder, is discussed in paragraph 1.4.2.9.9.

1.5.2.8.5 Spectrum analyzer. The recommended spectrum analyzer and display unit is the Sierra 360A or equal. This unit provides high-resolution swept-band visual display for direct viewing of carrier mux and HF communications signals. It allows simultaneous measurement of the displayed signal on a companion selective voltmeter without external test equipment. Resolves signals separated by as little as 30 to 40 Hz. Automatic tracking with companion selective voltmeter. Applications: analysis of operating carrier system showing levels of carrier signaling tone, carrier leak, crosstalk, noise, telegraph, and telemetry subcarrier; and rapid identification and isolation of circuits having an out-of-limit signal, overload, or noise condition. Analysis of HF communications systems showing modulation level and distortion, intermodulation products, spurious responses, and noise. The Sierra model 360A, spectrum display unit, provides a unique approach to the initial lineup and maintenance of carrier mux and HF radio systems. The instrument is used in conjunction with a Sierra model 128A, frequency selective voltmeter, or model 305A, frequency selective level meter, and the resulting test system combines the level stability and frequency accuracy of the voltmeter with the rapid and accurate signal analysis capabilities of the display unit. The selective voltmeter and display unit track together automatically. The combination provides a method of scanning the entire frequency spectrum within the tuning range of the selective voltmeter and expanding any portion of it on a high-resolution, sweptband visual display. Crystal-controlled frequency accuracy permits absolute identification and analysis of signals without the use of external marker generators, conversion generators,

or frequency counters. Three sweep-width selections allow the operator to view and analyze a window of 120 kHz, 12 kHz, or 3.6 kHz; and resolve signals separated by as little as 30 to 40 Hz. This instrument permits rapid detection of unusual system conditions such as out-of-limit signals, overload, and noise. Simultaneous precision measurements of the frequency and amplitude of specific displayed signals can be made on the companion selective voltmeter. By using the three sweep widths of the display unit, it is possible to examine any portion of the frequency spectrum in detail. A visual display of carrier and signaling tone level, carrier leak, crosstalk on suppressed-carrier systems, noise, intermodulation products, and other conditions is presented. HF communications applications including analysis of signal and modulation conditions, modulation distortion, intermodulation products, and other conditions are presented. HF communications applications include analysis of signal and modulation conditions, modulation distortion, intermodulation products, noise, spurious responses, and detection of 60- and 120-Hz hum modulation.

1.5.2.8.6 Selective level voltmeter. The suggested selective voltmeter to be used with the spectrum display unit is the Sierra 128A or equal. The Sierra 128A provides single-range continuous tuning from 4 kHz to 15.2 MHz. It is compatible with the Sierra model 360A, spectrum display unit, and tracks automatically with Sierra model 351A, signal generator. It has all solid-state circuitry, crystal-controlled accuracy, and reads directly in dBm and volts with level readings down to -110 dBm. The Sierra model 128A, carrier frequency voltmeter, provides outstanding accuracy and sensitivity for measurement of signals between 4 kHz and 15.2 MHz. Single-range tuning and crystal-controlled frequency accuracy with phase-lock circuitry combine to make it exceptionally useful for fast, precise carrier system measurements, bandpass measurements, and wave analysis. An expanded-scale meter accessory, model 128MA, provides 0.01-dB resolution within a 2-dB total range. This accessory permits high-precision measurements of relative signal levels at any point within the frequency range of the voltmeter. The capabilities of model 128A are further enhanced by operating the voltmeter in conjunction with a Sierra spectrum display unit, model 360A.

1.5.2.8.7 Test oscillator. If a test oscillator is required, the HP-652A or equal is suggested. This unit provides amplitude and frequency stability of the test signal for measurements from 10 Hz to 10 MHz. Two output impedances are available on the front panel providing 200 milliwatts into 50 ohms or 16 milliwatts into 600 ohms. The 652 has an expandable monitor for amplitude control to 0.25 percent across the band. The 652 is a portable unit but comes equipped with a rack-mounting kit.

### 1.5.2.9 Wideband digital test bay.

1.5.2.9.1 General. The wideband digital test bay, USACEEIA Specification, CCC-75070, is a comprehensive error-measuring device used in wideband digital communications systems. The system is modular in design which results in a high degree of flexibility. The test bay can exercise a wide variety of digital communications systems. The wideband digital test bay is shown in figure 1-39.

1.5.2.9.2 Oscilloscope. A recommended oscilloscope for high-speed digital testing is the TEKTRONIX R475 or equal. The TEKTRONIX R475 features a 1ns/div sweep rate, an 8- by 10-cm calibrated display, a trigger view, an automatic V/div readout, versatile trigger selection, and an optional battery operation. The oscilloscope's operation has been simplified by single-functions pushbuttons, control knob design, layout, and color-coordinated front panels. Optional equipments recommended are the 1X or 10X attenuation probes, TEKTRONIX P/N P6063B; and Rack Adapter, TEKTRONIX P/N 016-0556-00.

### 1.5.2.9.3 Frequency synthesizer.

1.5.2.9.3.1 A recommended synthesizer for use in the wideband digital test bay is the Syntest, SI-102 or equal. The Syntest, SI-102 is an advanced 5-1/2-digit modular synthesizer employing a single-phase locked loop to provide high performance. Designed as a system component, the SI-102 provides .1-Hz to 16-MHz transistor-to-transistor logic signals into a 500-ohm load with low-phase noise and spurious signals. Some typical applications of the SI-102 are as follows:

- a. Use in plotting and alignment of active and passive filters.
- b. Use as a variable frequency generator in automatic test sets using BCD programing.
- c. Use to provide adjustable, stable, power line frequencies.
- d. Use to provide precise variable speed control for synchronous motor drives.
- e. Use for rapid inspection and testing of large array combination filters.
- f. Use as a calibration standard for analog oscillators, touch-tone equipment, and sequential-tone decoders.
- g. Use as a transceiver local oscillator, precision variable clock for integrated circuit system testing.

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45	BLANK PANEL	QTY	MATERIAL LIST ITEM	GFE	CFE
	BLANK PANEL	1	EQUIPMENT RACK CCC-75054		
40	BLANK PANEL	1	BLANK PANEL 1 3/4" EMCOR PNA-1		
	BLANK PANEL	3	BLANK PANEL 5 1/4" EMCOR PNA-5		
35	BLANK PANEL	1	BLANK PANEL 3 1/2" EMCOR PNA-3		
30	OSCILLOSCOPE TEKTRONIX R475	1	BLANK PANEL 7" EMCOR PNA-7		
	FREQUENCY SYNTHESIZER	1	BLANK PANEL 8 3/4" EMCOR PNA-8		
25	PCM/TDM ERROR RATE MEASURING SET HP-3780A	1	OSCILLOSCOPE TEKTRONIX R475		
20	INTERBAY PANEL	1	FREQUENCY SYNTHESIZER SYNTEST S110205015013		
	MISC PANEL	1	ERROR RATE MEASURING SET HP-3780A		
15	WRITING SHELF	1	THERMAL PRINTER HP-5150A		
	THERMAL PRINTER HP-5150A	1	INTERBAY PANEL CCC-75074		
10	BLANK PANEL	1	MISC PANEL CCC-75073		
	BLANK PANEL	1	WRITING SHELF EMCOR RS-18A		
5					
4					
3					
2					
1	AC CONV				
0					

Figure 1-39. Wideband digital test bay,  
USACEEIA Specification 75070.



h. Use for testing electronic and mechanical servo systems.

1.5.2.9.3.2 When procuring the Syntest, SI-102-005-015-013, synthesizer, the procurement order must include the modified for internal oscillator or external (1-MHz or 5-MHz selectable) reference option as well as the output to drive a 75-ohm load and the 19-inch rack-mounting kit.

1.5.2.9.4 Pulse code modulation/time division multiplex error measuring set. An error measuring set such as the HP-3780A or equal is recommended for use in the wideband digital test bay. The instrument measures binary errors and code errors in digital transmission equipment operating at bit rates between 1 kb/s and 50 Mb/s. Frequency offset generation and measurement are provided at the standard bit rates used in PCM/TDM transmissions. Binary errors are detected by simulating the system with a test pattern and comparing the output bit-by-bit with a separate internally-generated error-free pattern. Code errors on interface or line-coded information are detected during decoding into binary data. The errors can be counted over a chosen gating period and displayed directly as bit error rate (BER) or total error count (COUNT). BER or COUNT results can be displayed directly by the LED's on the front panel or monitored via a BCD printer and strip chart recorder. This makes the HP-3780A suitable for unattended long-term measurements. When procuring the HP-3780A options, H-38 (internal check rates of 1.544, 6.176, and 12.928 Mb/s with a 78-ohm balanced  $\pm 3$ -V output) and 908 (rack-mounting kit) must be specified.

1.5.2.9.5 Thermal printer. The HP-5150A thermal printer or equal is recommended for use in the wideband system. The printer is designed to accept and record up to 20 columns of data from digital instruments. Because it uses a thermal printing technique, it is extraordinarily quiet. Two input interfaces are available; however, option 002, BCD interface, is recommended. With option 002 installed, the printer will accept 10 columns of transistor-to-transistor logic-level BCD data. Two options 002 may be installed for 20-column printout from one or two sources. The standard 16-member character set consists of 0 through 9, +, -, V, A, R, and blank. Special character sets which draw from the 64-character upper-case American standard code for information exchange (ASCII) set may also be specified. Option 004, clock, is also recommended. This option gives the printers the additional capabilities of elapse time control between successive data printouts and printing the time of day following each data printout.

1.5.10 Electromagnetic compatibility problems. In the design of wideband patching and testing facilities, careful consideration should be given to grounding techniques used, cable routing, and cable selection. As high frequencies are involved, the grounding

system must be designed to have a low impedance at high frequencies. The wideband cables should not be routed close to power cables, control cables, or other cables that may be noisy. In general, balanced circuits with twinaxial cables are preferred for wideband systems. Where unbalanced circuits are used, triaxial cables should be used.

1.6 LIST OF APPLICABLE DOCUMENTS. The following documents are referenced and should be used as required:

SPECIFICATIONS

MIL-D-1000	Drawings, Engineering, and Associated Lists
CCC-75046	VF Patch Bay Equipment
CCC-75047	2/W Audio Patch Panel
CCC-75048	VF Interbay Patch Panel
CCC-75049	Miscellaneous Patch Panel
CCC-75050	Equipment Rack (Patching)
CCC-75051	Alarm Display Panel
CCC-75052	48 Lamp Interbay Patch Panel
CCC-75057	DC Low Level Patch Bay Equipped
CCC-75058	DC Low Level Patch Panel
CCC-57059	Ground Box
CCC-75060	DC High Level Patch Panel
CCC-75061	Speaker, Amplifier
CCC-75063	Digital Line Interface Unit
CCC-75064	DC Power Supplies
CCC-75065	Power Distribution Bay
CCC-75066	DC Low Level Ballast Lamp Panel
CCC-75067	Circuit Concentration Frame Bay

CCC-75068	Circuit Concentration Frame Module
CCC-75069	FDM (Analog) Test Bay
CCC-75070	Digital (High Speed) Test Bay
CCC-75071	Twinaxial Patch Panel
CCC-75072	Coaxial Patch Panel
CCC-75073	Wideband Miscellaneous Patch Panel
CCC-75076	Wideband Auxiliary Patch (Twinaxial)
CCC-75077	Wideband Auxiliary Patch (Coaxial)

## STANDARDS

MIL-STD-12	Abbreviations for Use on Drawings, Specifications, Standards, and in Technical Documents
MIL-STD-100	Engineering Drawing Practices
MIL-STD-188C	Communication System Technical Standards
MIL-STD-188-100	Common Long Haul and Tactical Communications System Technical Standards
MIL-STD-188-124	Grounding, Bonding and Shielding
MIL-STD-188-310	Subsystem Design and Engineering Standards for Technical Control Facilities
MIL-STD-188-311	Technical Design Standards for Frequency Division Multiplexers
MIL-STD-188-313	System Design and Engineering Standards and Equipment Technical Design Standards for Long Haul Communications Traversing Microwave LOS Radio and Tropospheric Scatter Radio

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MIL-STD-189

Racks, Electrical Equipment,  
19-inch and Associated Panels

MIL-STD-1472B

Human Engineering Design Criteria  
for Military Systems, Equipment  
and Facilities

#### OTHER PUBLICATIONS

##### Manuals

TM 11-6625-1668-12

Operator and Organizational Main-  
tenance Manual Including Repair  
Parts and Special Tool Lists:  
Test Sets, Telegraph  
AN/GGM-15(V)1 and AN/GGM-15(V)2

CCTM 105-50-6

Telecommunications Engineering-  
Installation Practices for Tech-  
nical Control Facilities

##### Regulations

AR 5-4

Department of the Army Producti-  
vity Improvement Program.

AR 105-6

Communications-Electronics Stand-  
ardized Telecommunications Program

(C)AR 530-4

Operational and Signal Security,  
Control of Compromising Emanations

AR 310-50

Authorized Abbreviations and  
Brevity Codes

CCR 702-1-2

Quality Assurance Program for  
Engineering, Installation, and  
Acceptance of  
Communications-Electronics Equip-  
ment and Systems

CCCR 34-2

Standardization Preparation of  
Engineering Installation Packages  
and Standard Engineering  
Installation Packages

CCCR 34-3

Engineer Drawings

CCCR 702-1	Product Assurance, USACEEIA Quality Assurance and Testing Program
CCCR 702-2	Product Assurance, Preparation of Documentation for Test and Evaluation of Communications-Electronics Material
CCCR 702-3	Role of the Test Director
CCCR 702-4	Quality Assurance During Onsite Installation
CCCR 702-7	Quality Assurance Corrective Actions
Handbooks	
(C)MIL-HDBK-232	RED/BLACK Engineering Installation Guidelines (U)
MIL-HDBK-411	Long Haul Communications (DCS) Power and Environmental Control for Physical Plant
Directives	
DCAC 300-175-9	Standards DCS Operating-Maintenance Electrical Performance Standards
DCAC 310-50-3	Policies Concept for Technical Control of the Defense Communications System
DCAC 310-50-6	Policies Defense Communications System Orderwire Concept
DCAC 310-55-1	Operations Status Reporting for the Defense Communications System
DCAC 310-70-1	Methods and Procedures, DCS Technical Control, Volume I, Policy and Facilities

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DCAC 330-175-1	Standards Defense Communications System (DCS) Engineering Installation Standards Manual, Annex A, Television System and Equipment Standards
DCAC 370-160-2	Management responsibilities for Site Surveys
DCAC 370-160-3	Installations and Construction, Site Survey Data Book for Communications Facilities
SB 700-20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items
TO 31-10 Series	Standard Installation Practices
CCP 11-1	Army Program Value Engineering
CCP 750-2	Test, Measurement, and Diagnostic Equipment Preferred Items List
SEIP 020	Uninterruptible Power Facilities (48 Volts dc)
CCC-TED-73-TP-87	Quality Assurance Evaluation and Technical Acceptance Test Plan for Worldwide Technical Control Improvement Program-Army
Sacramento Army Depot	Onsite Quality Control Inspection Plan for Worldwide Technical Control Improvement Plan, 5 Oct 77
USACEI-Bn Pamphlet 105-3 (Draft,	Communications-Electronics Installation Planning and Implementation Guide
NFPA No. 70-1978	National Electric Code

#### 1.7 COMMENTS ON PUBLICATION.

a. Users of this publication are invited to submit recommendations for its improvement. Comments should be keyed to the drawing, page, paragraph, and line of the text for which the

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change is recommended. For convenience, a mailing card is provided. Comments should be sent directly to Commander, Headquarters, US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP, Fort Huachuca, Arizona 85613.

b. Requests for USACEEIA regulations and forms should be addressed to the Commander, Headquarters, US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-SPT-RM, Fort Huachuca, Arizona 85613.

## SECTION 2. SITE SURVEY DATA AND CHECKLIST

2.1 GENERAL. The site survey is conducted by the detail engineer, site personnel, and/or by a USACEEIA designee before any attempt to upgrade an existing facility or to install a new facility. The survey ensures data necessary for the determination of the related support requirements. The site survey also defines the existing facility and its capabilities and provides data and recommendations so that an analysis can be made and an approach to the site installation package recommended.

### 2.2 SURVEY PROCEDURE.

2.2.1 Advance notice. Advance notice will be given to the site commander before date of survey. The notification will pass through the chain of command to ensure all levels of command are aware of the visit. A request will be made at this time for the necessary support requirements, i.e., site access, identification card if required, or any other assistance needed. A proposed schedule of events will be included. The site commander will be requested to provide the name, address, and phone number of knowledgeable personnel to USACEEIA, and arrange for them to be available during the survey. These persons must be familiar with the existing power, communications circuits, and equipment. The O&M commander will be requested to provide a single point of contact for coordination by name, grade, and phone number. The site commander will also be requested to make copies of drawings of the building, power and grounding, communications circuits, and site configuration available to the engineer.

2.2.2 Onsite inspection. The site survey will be conducted in accordance with DCAC 370-160-2 and DCAC 370-160-3. Problems with existing facilities should be described in detail adding additional sheets if necessary. Recommendations should be included as to the usefulness of existing equipment.

2.2.3 Participant's concurrence. All participants of the site survey will sign a statement of their concurrence to the findings of the site survey. The document will be attached to the site survey package and will serve to verify the accuracy of the survey package unless otherwise indicated.

2.2.4 Site survey checklist. The sample site survey checklist shown in figure 2-1 may be used. All written material must be legible; abbreviations should be in accordance with AR 310-50 or a glossary of terms and definitions should be included.



## SITE SURVEY CHECKLIST

1. GENERAL. \_\_\_\_\_
- a. Date: \_\_\_\_\_
- b. Site location: \_\_\_\_\_  
Installation \_\_\_\_\_
- City \_\_\_\_\_ State \_\_\_\_\_ Country \_\_\_\_\_
- c. Project number: \_\_\_\_\_
- d. Project authority: \_\_\_\_\_
- e. Project engineer: \_\_\_\_\_  
Name \_\_\_\_\_  
Organization \_\_\_\_\_ Office symbol \_\_\_\_\_  
Installation \_\_\_\_\_  
AUTOVON \_\_\_\_\_ Commercial telephone no. \_\_\_\_\_
- f. Classification: \_\_\_\_\_
- g. Brief task description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- h. Period of survey: day: \_\_\_\_ month: \_\_\_\_ year: \_\_\_\_; to  
day: \_\_\_\_ month: \_\_\_\_ year: \_\_\_\_.

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2. COMMAND RELATIONSHIPS.

a. Major area command: \_\_\_\_\_

b. Local command: \_\_\_\_\_

c. Operating command: \_\_\_\_\_

d. Cognizant construction agency: \_\_\_\_\_

e. Cognizant engineering agency: \_\_\_\_\_

3. COMPOSITION OF SURVEY TEAM.

<u>Name, Title</u>	<u>Organization</u>	<u>Telephone No.</u>
Team chief	_____	_____
Member	_____	_____
Member	_____	_____
Member	_____	_____

4. KEY LOCAL PERSONNEL CONTACTED.

<u>Name, Title</u>	<u>Representing</u>	<u>Telephone No.</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

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5. BACKGROUND DATA ON RATIONALE FOR SITE SURVEY. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. DESCRIPTION OF THE MISSION AND FUNCTION OF THE FACILITY. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. DEVIATIONS FROM SITE SURVEY CRITERIA IN DCAC 330-175-1. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. ACCESS SECURITY CLEARANCE REQUIREMENTS FOR ENGINEERING/INSTALLATION PERSONNEL. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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9. EQUIPMENT TO BE INSTALLED.

- a. Contractor furnished and installed.
- b. Government furnished and installed.
- c. Government furnished, contractor installed.
- d. Equipment physical description chart.

		<u>Overall Dimensions (In)</u>			Wgt (lbs)
Qty	Nomenclature	Height	Width	Depth	

- e. Equipment characteristic chart.

Nomenclature	<u>Operating Conditions</u>		<u>Input Power</u>		<u>Power</u>
	Temperature	Relative Humidity	Voltage	Frequency	Consumptio

10. LIST OF ATTACHMENTS.

_____	_____
_____	_____
_____	_____
_____	_____

## 11. OTHER PERTINENT OR GENERAL INFORMATION WHICH WILL REFLECT ON ENGINEERING.

_____
_____
_____
_____

## 12. LIST ALL COMPLETED FORMS AND DRAWINGS THAT HAVE BEEN CLASSIFIED AND PROCESSED UNDER SEPARATE COVER BY FORM NUMBER OR DRAWING TITLE.

_____	_____
_____	_____
_____	_____
_____	_____

13. PROFILES.

a. Location: \_\_\_\_\_

b. Site marker coordinates:

(1) Latitude: \_\_\_\_ degrees: \_\_\_\_ minutes: \_\_\_\_  
seconds: \_\_\_\_(2) Longitude: \_\_\_\_ degrees: \_\_\_\_ minutes: \_\_\_\_  
seconds: \_\_\_\_

c. Date: \_\_\_\_\_ temperature: \_\_\_\_\_ visibility: \_\_\_\_\_

d. Recorder: \_\_\_\_\_ Instrument man: \_\_\_\_\_

Figure 2-1. Sample site survey checklist (sheet 5 of 9).

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14. MAPS AND PHOTOGRAPHS OBTAINED BY THE SURVEY TEAM.

a. Maps:

(1) Title: \_\_\_\_\_

(2) Map series: \_\_\_\_\_

(3) Type: \_\_\_\_\_

(4) Territory: \_\_\_\_\_

(5) Scale and date: \_\_\_\_\_

(6) Special data: \_\_\_\_\_

b. Photographs:

(1) Title: \_\_\_\_\_

(2) Source: \_\_\_\_\_

(3) Date: \_\_\_\_\_

(4) Shows: \_\_\_\_\_

Figure 2-1. Sample site survey checklist (sheet 6 of 9).

15. ENGINEERING DATA.

## a. Buildings (existing).

- (1) Indicate probable use: \_\_\_\_\_
- (2) Available area: \_\_\_\_\_ ft<sup>2</sup>, length: \_\_\_\_\_ ft X width: \_\_\_\_\_ ft
- (3) Ceiling height: \_\_\_\_\_ feet above finished floor.
- (4) Allowable floor load: \_\_\_\_\_ psf.
- (5) Existing shielding: \_\_\_\_\_
- (6) Existing acoustic treatment: \_\_\_\_\_
- (7) Available heating capacity: \_\_\_\_\_ Btu/hr.
- (8) Available air-conditioning capacity: \_\_\_\_\_ Btu/hr.
- (9) Available ventilating capacity: \_\_\_\_\_ ft<sup>3</sup>/min.
- (10) List of as-built drawings obtained:
- (a) Title: \_\_\_\_\_ date: \_\_\_\_\_
- drawing number: \_\_\_\_\_ issue: \_\_\_\_\_
- (b) Type: \_\_\_\_\_  
(Site, mechanical, electrical, equipment)
- (c) Design agency: \_\_\_\_\_
- (d) Source of information: \_\_\_\_\_
- b. Power building (existing).
- (1) Available area: \_\_\_\_\_ ft<sup>2</sup>, length: \_\_\_\_\_ ft X width: \_\_\_\_\_ ft.
- (2) Ceiling height: \_\_\_\_\_ feet above finished floor.

Figure 2-1. Sample site survey checklist (sheet 7 of 9).

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(3) Allowable floor load: \_\_\_\_\_ psf.

(4) Existing shielding: \_\_\_\_\_

\_\_\_\_\_

(5) Existing acoustic treatment: \_\_\_\_\_

\_\_\_\_\_

(6) Available heating capacity: \_\_\_\_\_ Btu/hr.

(7) Available ventilating capacity: \_\_\_\_\_ Btu/hr.

(8) List of as-built drawings obtained:

(a) Title: \_\_\_\_\_ date: \_\_\_\_\_  
drawing number: \_\_\_\_\_ issue: \_\_\_\_\_

(b) Type: \_\_\_\_\_  
(Site, mechanical, electrical, equipment)

(c) Design agency: \_\_\_\_\_

(d) Source of information: \_\_\_\_\_

\_\_\_\_\_

c. Physical survivability.

(1) Hardness of proposed facility: \_\_\_\_\_ psi

(2) Located \_\_\_\_\_ miles \_\_\_\_\_ from prime target area.  
(direction)

(3) Fallout protection: \_\_\_\_\_ hours/days survivability.

(4) Other factors: \_\_\_\_\_

\_\_\_\_\_

d. Physical security.

(1) If adequate, describe: \_\_\_\_\_

\_\_\_\_\_

(2) If inadequate, list steps necessary to make adequate: \_\_\_\_\_

\_\_\_\_\_

Figure 2-1. Sample site survey checklist (sheet 8 of 9).



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16. REMARKS AND PERTINENT DATA NOT COVERED IN PRECEDING SHEETS.

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\_\_\_\_\_  
Team chief

Figure 2-1. Sample site survey checklist (sheet 9 of 9).

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2.2.5 Existing drawings. Site configuration of the building, power, site locations, communications circuits, rack elevations, heat/air-condition ducting, and any other drawings available will be used to the maximum. Where drawings have been outdated by additions and changes, and old drawings are not available or suitable for revision, the survey team will then develop new drawings or sketches.

2.2.6 Army Security Agency concurrence. Sites with communications centers or other secure areas to be upgraded or new facilities installed will be surveyed. The Army Security Agency will be contacted and their concurrence obtained on the findings and new requirements. A classification may be placed on the survey package at this time. If possible, the classified portion of the survey should be separated from the unclassified portion.

2.2.7 Survey contents. The site survey package will contain information showing the present configuration and equipment. The contents will include but not be limited to the following:

- a. Building and power drawings.
- b. Technical control equipment inventory (including test equipment).
- c. Transmission equipment inventory.
- d. Subscriber and circuit information list.
- e. Floor plan (equipment layout).
- f. Station grounding.
- g. Rack elevation drawings (include frame layout, type of block, etc.).
- h. Photographs.
- i. Single line and block diagrams.
- j. Outside plant cable.
- k. System diagram.
- l. Supplemental survey information.
- m. Floor and ceiling loading.

n. Conversion requirement (in-house and subscriber) (equipment and circuits).

o. Area considerations and facilities.

p. Manpower data.

2.3 SUPPLEMENTARY DATA. The site survey team will perform field surveys consisting of a site reconnaissance to collect and record topographical, geological, climatological, and electromagnetic data pertinent to the communications site or facility. Supplementary data is often required to ensure a facility is adapted to the selected location, or that an existing facility is properly upgraded. Figure 2-2 illustrates sample data collection sheets that may be used to record the supplementary information and when completed be provided as attachments to the site survey report.

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WORKING CIRCUITS APPEARING  
AT TCF AUDIO PATCH BAYS

[illegible]

Figure 2-2. Sample data collection sheets (sheet 1 of 29).

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WORKING CIRCUITS APPEARING  
AT TCF DC PATCH BAYS

[illegible]

Figure 2-2. Sample data collection sheets (sheet 2 of 29).

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# WORKING CIRCUITS BYPASSING TCF PATCH BAYS

[illegible]

STATION \_\_\_\_\_

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 3 of 29).

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CIRCUITS OVER VF MULTIPLEX

STATION \_\_\_\_\_ BUILDING \_\_\_\_\_ ROOM \_\_\_\_\_ DISTANCE FROM T(

NOMENCLATURE \_\_\_\_\_ SUPERGROUP \_\_\_\_\_ GROUP \_\_\_\_\_

CH. NO.	CCSD NO.	TYPE OF SERVICE	SIGNALING	THRU CONNECTION
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

TOTALS

NUMBER OF THRU CIRCUITS \_\_\_\_\_

NUMBER OF TERMINATED CIRCUITS \_\_\_\_\_

NUMBER OF SPARE CHANNELS \_\_\_\_\_

FORM

DATE

Figure 2-2. Samp

7

TCF (FT) \_\_\_\_\_ LINK NO. \_\_\_\_\_

TRUNK

[illegible]

COMPLETED BY \_\_\_\_\_

\_\_\_\_\_

ple data collection sheets (sheet 4 of 29).



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## CIRCUITS OVER MILITARY CABLE

STATION \_\_\_\_\_ BUILDING \_\_\_\_\_ ROOM \_\_\_\_\_ MDF TO TCF (FT) \_\_\_\_\_  
 CABLE NO. \_\_\_\_\_ LINK NO. \_\_\_\_\_ DISTANT STATION \_\_\_\_\_ LI \_\_\_\_\_  
 GAUGE \_\_\_\_\_ SIZE (PAIRS) \_\_\_\_\_ WORKING PAIRS \_\_\_\_\_ SF \_\_\_\_\_

CCSD NO.	PRI ORITY	TYPE OF SERVICE	SPEED (DATA)	2 OR 4 WIRE	SIGNALING	TCF	CON

TO USER

THRU

NUMBER OF VF CIRCUITS

\_\_\_\_\_

\_\_\_\_\_

NUMBER OF DC CIRCUITS

\_\_\_\_\_

\_\_\_\_\_

FORM CC

DATE: \_\_\_\_\_

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LENGTH (FT) \_\_\_\_\_

SPARE PAIRS \_\_\_\_\_

THRU ONNECTION	LOCAL TERM	CONDITIONING EQ.			
		DLY EQUAL	ECHO SUPP	RPT COIL	PEAK LIMIT

COMPLETED BY \_\_\_\_\_

\_\_\_\_\_

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# CIRCUITS OVER COMMERCIAL CABLE

STATION \_\_\_\_\_ CABLE TERMINAL BLDG \_\_\_\_\_ CABLE TERMINAL

TCF TO MDF (FT) \_\_\_\_\_ CABLE NO. \_\_\_\_\_

CCSD NO.	PRI ORITY	TYPE OF SERVICE	SPEED (DATA)	2 OR 4 WIRE	SIGNALING	TCF	CON

TO USER

THRU

NUMBER OF VF CIRCUITS

NUMBER OF DC CIRCUITS

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

FORM COM

DATE: \_\_\_\_

Figure 2-2. Sample d

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CRIMINAL ROOM

[illegible]

FORM COMPLETED BY

TE: \_\_\_\_\_

Sample data collection sheets (sheet 6 of 29).

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VOICE FREQUENCY CARRIER TELEGRAPH (VFCT)

STATION \_\_\_\_\_ BUILDING \_\_\_\_\_ ROOM \_\_\_\_\_ DISTANCE TO TCF (F  
NOMENCLATURE \_\_\_\_\_ DISTANT TERMINAL \_\_\_\_\_ HIGH OR LOW LEVEL \_\_\_\_\_

CH. NO.	CCSD NO.	PRIORITY	SPEED BAUD	MODE OF OPERATION	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					

TOTALS

1  
NUMBER OF THRU CIRCUITS

\_\_\_\_\_

NUMBER OF USER CIRCUITS

\_\_\_\_\_

NUMBER OF SPARE CHANNELS

\_\_\_\_\_

FORM

DATE

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TCF (FT) \_\_\_\_\_ TRUNK NO. \_\_\_\_\_

\_\_\_\_\_ DTXX \_\_\_\_\_

THRU, USER OR SPARE	REGEN RPTR

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

SEIP 006

## LOCAL USER INFORMATION VOICE FREQUENCY (VOICE DATA)

STATION \_\_\_\_\_

[illegible]

FORM C

DATE:

Figure 2-2. Sample

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TA)

SPEED (DATA)	2 OR 4 WIRE	TELEPHONE SIGNALING		COMSEC EQUIP
		TRANS. MEDIA	TO USER	

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

Sample data collection sheets (sheet 8 of 29).



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LOCAL USER INFORMATION (DC)

STATION \_\_\_\_\_

CCSD NO.	END INSTRUMENT TYPE/MODEL NO.	LOCATION		DISTANCE (FEET)	SPEED	2 OR 4 WIRE	COMSEC EQUIP
		BLDG	ROOM				

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

SEIP 006

[illegible]

DATE: \_\_\_\_\_

Sample data collection sheets (sheet 9 of 29).

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COMSEC EQUIPMENT

[illegible]

STATION \_\_\_\_\_

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 10 of 29).

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TRANSMISSION SYSTEMS  
RADIO AND CABLE CARRIER

MEDIA				
LINK				
CONNECTING LOCATION				
RADIO EQUIP				
MULTIPLEX				
P L O T	SYNCH KHZ			
	SUPERGROUP KHZ			
	GROUP KHZ			
S U P E R G R O U P	EQUIPPED			
	IN USE			
	THRU			
	IMPEDANCE OHMS			
	LEVEL SEND dBm			
	LEVEL RCV dBm			
	FREQUENCY KHZ			
G R O U P	EQUIPPED			
	IN USE			
	THRU			
	IMPEDANCE OHMS			
	LEVEL SEND dBm			
	LEVEL RCV dBm			
	FREQUENCY KHZ			
C H A N N E L	EQUIPPED			
	IN USE			
	LEVEL SEND dBm			
	LEVEL RCV dBm			
OUT OF BAND SIGNALING	QUANTITY			
	FREQUENCY			
DISTANCE TO T/F (FEET)				

STATION \_\_\_\_\_ FORM COMPLETED BY \_\_\_\_\_  
DATE \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 11 of 29).

Figure 2-2. Sample data collection sheets (sheet 12 of 29).

[illegible]

STATION

FORM COMPLETED BY

DATE: \_\_\_\_\_

7

2

1940-1941

1940-1941

2018-19-2019-20

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

**NAME**

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## INTERCOMMUNICATIONS SYSTEM

TYPE: \_\_\_\_\_  
(Military Nomenclature or Model Number)

MANUFACTURER \_\_\_\_\_

LOCATION OF MASTER STATION

Building: \_\_\_\_\_ Room: \_\_\_\_\_ Rack No. \_\_\_\_\_

CAPACITY \_\_\_\_\_ IN-USE \_\_\_\_\_  
(How many Slave Stations can be (Total Stations in-use)  
Accommodated?)

LOCATION OF SLAVE STATIONS.

[illegible]

ATION \_\_\_\_\_ FORM 5 SUBMITTED BY \_\_\_\_\_  
DATE \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 14 of 29).

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Figure 2-2. Sample data collection sheets (sheet 15 of 29).

[illegible]

STATION

FORM COMPLETED BY

DATE:



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## ALARM SYSTEM

TYPE \_\_\_\_\_ MANUFACTURED \_\_\_\_\_

ALARM SYSTEM CAPACITY \_\_\_\_\_

## ALARM OUTPUTS

A AUDIBLE \_\_\_\_\_ B VISUAL \_\_\_\_\_ PAGE/TAPE PRINTER \_\_\_\_\_

## LOCATION OF MASTER ALARM DISPLAY

BUILDING \_\_\_\_\_ ROOM \_\_\_\_\_ RACK \_\_\_\_\_

LOCATION OF SLAVE DISPLAY PANELS

ROOM \_\_\_\_\_ RACK \_\_\_\_\_ ROOM \_\_\_\_\_ RACK \_\_\_\_\_

## TYPE AND LOCATION OF ALARM SOURCES

[illegible]

STATION \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

COMPLETED BY \_\_\_\_\_ DATE: \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 16 of 29).

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[illegible]

Figure 2-2. Sample data collection sheets (sheet 17 of 29).

RACK FACE ELEVATION

1. Bldg. No. \_\_\_\_\_

2. Room No. \_\_\_\_\_

3. Rack No. \_\_\_\_\_

4. Rack Function \_\_\_\_\_

5. Rack Size

5.1 Height \_\_\_\_\_

5.2 Rack Equipment Width

19 inches ☐

23 inches ☐

Other \_\_\_\_\_ inches

5.3 Depth \_\_\_\_\_

5.4 Mounting Space Size \_\_\_\_\_

5.5 Total No. of MTC Spaces \_\_\_\_\_

6. Cable Feed: Top ☐ Bottom ☐

STATION \_\_\_\_\_

COMPLETED BY \_\_\_\_\_

DATE \_\_\_\_\_

58  
55  
50  
45  
40  
35  
30  
25  
20  
15  
10  
5

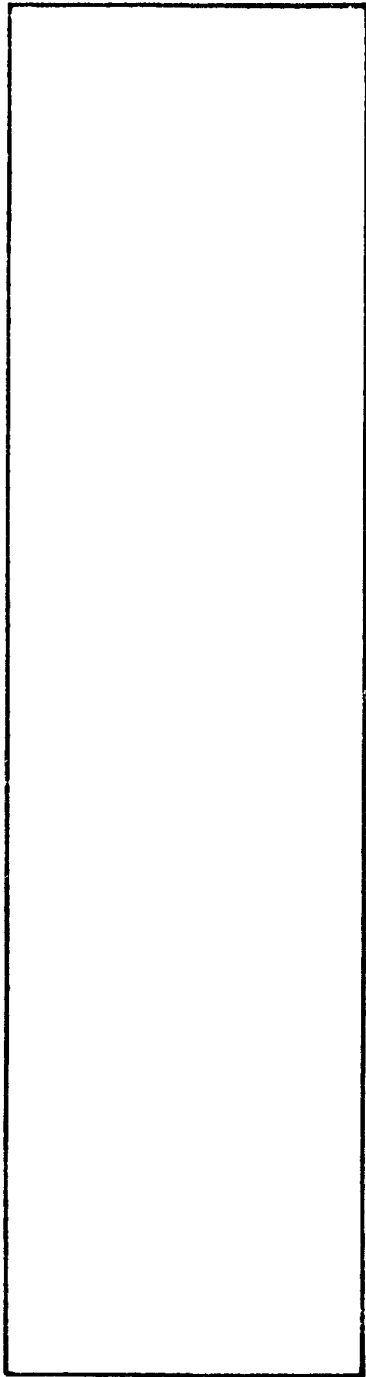


Figure 2-2. Sample data collection sheets (sheet 18 of 29).

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JACKFIELD PANELS (AUDIO AND DC)

STATION \_\_\_\_\_

BUILDING \_\_\_\_\_ ROOM \_\_\_\_\_ RACK NO. \_\_\_\_\_ VF OR DC \_\_\_\_\_ RED \_\_\_\_\_

DETAIL OR FIGURE	QUANTITY		NO. OF JACK POSITIONS	HEIGHT (INCHES)	WIDTH (INCHES)	UNITIZED	CONNE
	INSTALLED	IN USE					

1  
NUMBER OF JACK PANEL DRAWINGS ATTACHED \_\_\_\_\_

FORM COM

DATE: \_\_\_\_\_

Figure 2-2. Sample c

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RED OR BLACK \_\_\_\_\_ HI OR LO \_\_\_\_\_

CONNECTORIZED	HARDWIRED	CABLED TO	
		RACK T.B.	DF T.B.

FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

Sample data collection sheets (sheet 19 of 29).

[illegible]

FORM COMPLETED BY \_\_\_\_\_  
DATE: \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 20 of 29).

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DISTRIBUTION FRAME DETAILS

1. Building \_\_\_\_\_ 2. Room \_\_\_\_\_

3. Type of Frame: \_\_\_\_\_ MDF \_\_\_\_\_ LDF \_\_\_\_\_ IDF(Black) \_\_\_\_\_ IDF(Red)

4. Manufacturer: \_\_\_\_\_

5. Mounting: \_\_\_\_\_ Wall \_\_\_\_\_ Floor \_\_\_\_\_ Cabinet

6. Dimensions: \_\_\_\_\_ Height \_\_\_\_\_ Depth \_\_\_\_\_ Width

7. Number of Vertical Sections: \_\_\_\_\_

8. Number of Horizontal Sections: \_\_\_\_\_

		Vertical	Horizontal
9. Total Number of Blocks	Installed	_____	_____
	In Use:	_____	_____
10. Total Number of Protectors	Installed	_____	_____
	In Use	_____	_____
11. Total Number of Vacant Positions:	Vertical Side	_____	
	Horizontal Side		_____
12. Type of Protectors	_____		
13. Cable Feed:	_____ Top _____ Bottom		
14. Remarks:	_____		

TA ON \_\_\_\_\_ COMPLETED BY \_\_\_\_\_  
DATE \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 21 of 29).

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SKELETAL FRAME DRAWING

☐ VERTICAL      ☐ TOP

☐ HORIZONTAL

☐ TOP

TYPE OF FRAME: MDF \_\_\_\_\_ OSF \_\_\_\_\_ IGF \_\_\_\_\_      DATE: \_\_\_\_\_

BUILDING NO. \_\_\_\_\_ ROOM NO. \_\_\_\_\_ SHEET \_\_\_\_\_ OF \_\_\_\_\_

STATION \_\_\_\_\_ FORM COMPLETED BY \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 22 of 29).

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STATION GROUND

DATE OF LAST GROUND MEASUREMENT:		MONTH		YEAR	
AC PROTECTIVE GROUND					
SIZE OF MAIN GROUND CONDUCTORS AMG					
ARE THEY CONTINUOUS TO SUBSTATION?					
WHAT IS THE MEASURED SYSTEM GROUND RESISTANCE IN OHMS?					
EXTERNAL GROUND POINTS					
WHAT IS THE GROUND RESISTANCE OF EACH POINT IN OHMS?					
ARE THEY DRIVEN GROUND RODS? IF SO, WHAT SIZE DIAMETER ROD OR PIPE IS USED?					
IS CHEMICAL TREATMENT USED?					
WAS WATER PIPE USED FOR GROUND POINT?					
IS SOIL TESTING REQUIRED?					
	HAZARD PROTECTIVE GROUND PLANE	BLACK SIGNAL GROUND PLANE	RED SIGNAL GROUND PLANE	BLACK SHIELD GROUND PLANE	RED SHIELD GROUND PLANE
SIZE OF MAIN GROUND CONDUCTOR AMG					
WHAT IS THE MEASURED SYSTEM GROUND RESISTANCE IN OHMS?					
WHERE IS THE GROUND PLANE LOCATED?					
HOW MANY SPARE TERMINALS ON BLOCK?					

FORM COMPLETED BY \_\_\_\_\_  
DATE: \_\_\_\_\_

STATION \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 23 of 29).

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## AC POWER DATA

## 1.0 PRIME POWER

1.1 Location: Building \_\_\_\_\_ Room \_\_\_\_\_

1.2 Supplier: Commercial ☐ Military ☐

## 1.3 Site Primary Power Output Characteristics

Capacity \_\_\_\_\_ KVA, Voltage \_\_\_\_\_ Phase \_\_\_\_\_

Frequency \_\_\_\_\_ Wires \_\_\_\_\_

1.4 Reliability: 0-5 Outages Per Year ☐  
6-10 Outages Per Year ☐  
Over 10, Give Number \_\_\_\_\_

1.5 Load \_\_\_\_\_ KVA

## 2.0 AUXILIARY POWER

2.1 Location: Building \_\_\_\_\_ Room \_\_\_\_\_

## 2.2 Auxiliary Power Output Characteristics:

Capacity \_\_\_\_\_ KVA, Standby \_\_\_\_\_ or Continuous Duty \_\_\_\_\_

Voltage \_\_\_\_\_ Phase \_\_\_\_\_ Frequency \_\_\_\_\_ Wires \_\_\_\_\_

Manual Start ☐ or Automatic Start ☐2.3 Elapsed Time Between Loss of Prime Power and Operation of  
Auxiliary Power Supply \_\_\_\_\_

2.4 Load \_\_\_\_\_ KVA

## 3.0 STANDBY POWER

3.1 Is standby power available to TCF yes \_\_\_\_\_ no \_\_\_\_\_

3.2 Location: Building \_\_\_\_\_ Room \_\_\_\_\_

## 3.3 Standby Power Characteristics:

Capacity \_\_\_\_\_ KVA, Standby \_\_\_\_\_ or Continuous Duty \_\_\_\_\_

Voltage \_\_\_\_\_ Phase \_\_\_\_\_ Frequency \_\_\_\_\_ Wires \_\_\_\_\_

Manual Start ☐ or Automatic Start ☐

3.4 Load \_\_\_\_\_ KVA

Figure 2-2. Sample data collection sheets (sheet 24 of 29).

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AC POWER DATA (cont'd)

4.0 NO-BREAK POWER

4.1 Is no break power available: Yes \_\_\_\_ No \_\_\_\_

4.2 Location: Building \_\_\_\_\_ Room \_\_\_\_\_

4.3 Type: ☐ Static, ☐ Battery, ☐ Flywheel, ☐ Other

4.4a Manufacturer \_\_\_\_\_

4.4b Model No. \_\_\_\_\_

4.5 No Break Power Output Characteristics:

Capacity \_\_\_\_\_ KVA, Voltage \_\_\_\_\_ Phase \_\_\_\_\_

Frequency \_\_\_\_\_ Wires \_\_\_\_\_

4.6 Peak Load on No break System \_\_\_\_\_ KVA

STATION \_\_\_\_\_ FORM COMPLETED BY \_\_\_\_\_  
DATE: \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 25 of 29).

## AC POWER DISTRIBUTION TO TCF

1. Prime power distribution to TCF:  
Above Ground \_\_\_\_\_ Below Ground \_\_\_\_\_
2. Does prime power system feed directly to the TCF service entrance or does it feed through a step-down transformer? \_\_\_\_\_
3. If power feeds TCF through a step-down transformer, complete the following, if not, go on to question 4.
  - a. Location of transformers: \_\_\_\_\_
  - b. Capacity or rating: \_\_\_\_\_ KVA
  - c. Primary feeder: Voltage \_\_\_\_\_ Phase \_\_\_\_\_ Wires \_\_\_\_\_
  - d. Secondary feeders: Voltage \_\_\_\_\_ Phase \_\_\_\_\_ Wires \_\_\_\_\_
  - e. Total load on transformer: \_\_\_\_\_ (KVA)
4. Complete as many power panel assignment charts as are necessary to report all power panels providing power distribution to the TCF.  
How many power panels are there? \_\_\_\_\_
5. Red/Black:
  - a. Are power runs separated? \_\_\_\_\_
  - b. Are power lines filtered? \_\_\_\_\_
  - c. Are lighting and convenience outlets in separate panels? \_\_\_\_\_
  - d. Are all power circuits properly identified at power panel? \_\_\_\_\_
  - e. Has critical technical power circuit been inspected to ensure that no nontechnical loads are connected? \_\_\_\_\_

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## A C POWER DISTRIBUTION TO TCF

[illegible]

NOTE: LIST THE PANEL NUMBER, CIRCUIT NUMBER, AND THE  
NUMBER, ASSIGNMENT AND BREAKER CAPACITY IN AMPS  
FOR EACH POWER PANEL SERVING THE ICF.  
IDENTIFY ALL ASSIGNED AND "PANE" POSITION.

STATION \_\_\_\_\_ BUILDING NUMBER \_\_\_\_\_  
FORM COMPLETED BY \_\_\_\_\_ DATE \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 27 of 29).

Figure 2-2. Sample data collection sheets (sheet 28 of 29).

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ENVIRONMENTAL EQUIPMENT

1. Air Conditioning

a. Primary Unit

Manufacturer \_\_\_\_\_

Model/Year \_\_\_\_\_

BTU \_\_\_\_\_

Bldg. \_\_\_\_\_ Room \_\_\_\_\_

TCF Usage (% of Total Capacity) \_\_\_\_\_

b. Secondary Unit

Manufacturer \_\_\_\_\_

Model/Year \_\_\_\_\_

BTU \_\_\_\_\_

Bldg. \_\_\_\_\_ Room \_\_\_\_\_

TCF Usage (% of Total Capacity) \_\_\_\_\_

2. Heating Units

a. Primary Unit

Manufacturer \_\_\_\_\_

Model/Year \_\_\_\_\_

Type \_\_\_\_\_

BTU \_\_\_\_\_

Bldg. \_\_\_\_\_ Room \_\_\_\_\_

TCF Usage (% of Total Capacity) \_\_\_\_\_

b. Secondary Unit

Manufacturer \_\_\_\_\_

Model/Year \_\_\_\_\_

Type \_\_\_\_\_

BTU \_\_\_\_\_

Bldg. \_\_\_\_\_ Room \_\_\_\_\_

TCF Usage (% of Total Capacity) \_\_\_\_\_

STATION \_\_\_\_\_ FORM COMPLETED BY \_\_\_\_\_

DATE: \_\_\_\_\_

Figure 2-2. Sample data collection sheets (sheet 29 of 29).

### SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1 GENERAL. The site EIP will contain an engineering analysis with alternatives when applicable, site coordination information, and the Communications-Engineering (C-E) plan with rationale given for the final recommendation. CCCR 34-2 explains the purpose, content, and preparation of an EIP. This section establishes the criteria for the preliminary and detailed engineering and installation of a technical control facility.

3.2 PRELIMINARY ENGINEERING. The preliminary engineering analysis is a study of the facility's existing capabilities and requirements for an upgrade. The site survey data is the prime source of information for the engineer performing the analysis. The engineering analysis is used to support the C-E plan and the cost estimate. The analysis will include a recommended approach to the upgrade with an alternate approach when applicable. Items to be replaced or modified will be discussed and if replacement is recommended a national stock number (NSN), manufacturer's type number, and manufacturer given for the replacement. The analysis will include but not be limited to the following areas:

- a. Power and buildings.
- b. Ventilation and heating.
- c. Transmission facilities.
- d. Subscriber circuits.
- e. Existing floor plan.
- f. Patch capabilities.
- g. Test capabilities.
- h. Supplemental information.
- i. Alternate plan.
- j. Alternate recommendations.
- k. Excess list.
- l. Impact with other programs or projects.



3.2.1 Value engineering. Value engineering (VE) is a method for reducing cost without compromising the quality and reliability of defense hardware or of operations and maintenance functions. Value engineering considerations are to achieve the required functions at the lowest total cost. Consistant requirements for performance must be considered during the planning/preliminary engineering phase of a project. Detailed information on VE is found in AR 5-4 and CCP 11-1.

3.2.2 Site preparation information. The site preparation information identifies the required actions necessary in support of the upgrade. Identified will be the operating command's responsibilities, post or facility engineer's responsibility, and engineering and/or installation contractor's responsibility. The site preparation information addresses the required repair and utility work, power, ground upgrade, building lighting, and floor space. The information furnished will include but not be limited to drawings that show the building preparation including ventilation and heating, equipment layout, location of power panels and ground boxes, and external cable requirements.

3.2.3 Communications-Engineering plan. The C-E plan is the document resulting from the site survey and engineering analysis. The C-E plan provides management baseline information necessary for detail engineering, budget considerations, and project scheduling. The C-E plan will show major end items of equipment to be installed or re-located and will show spare equipment and space to allow for future known projects plus normal growth. The C-E plan may not necessarily follow the format of this section.

3.2.4 Responsibility. The C-E plan for technical control facility/PTF upgrades are the responsibility of USACEEIA, but may be delegated to other Government activities or to a commercial contractor.

3.2.5 Location of the technical control facility. The C-E plan will show the location of any existing technical control facility/PTF and the proposed new facility to include post, camp, or station. Included will be the building, room or rooms, area map, map coordinates, distances from nearest town, and road markers.

3.2.6 Equipment layout (floor plan). The equipment layout will depict the location of all the equipment required for the upgrade. The equipment layout will be marked to show outside cable entry, power feeder boxes, outside ground feeder entry, and the physical location to other interfacing facilities, i.e., AUTODIN switch, AUTOVON switch, etc. The floor plan will allow for future planned upgrade and a normal 25 percent growth .

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3.2.7 Rack elevations. The rack elevation drawings will show all racks to be installed, including equipment to be reused. The elevation drawings will call out as Government-furnished all equipment to be installed but not procured under the statement of work for the technical control improvement program (TCIP) accompanying the C-E plan.

3.2.8 Circuit layout. The required conditioning equipment will be shown in its string in accordance with MIL-STD-188-310. The quantity and type of each string and the required LCE modules will be designated by the DCA office issuing the technical service order (TSO). All conditioning equipment in use will appear between the primary patch bay and the equal level bay. Dc circuits will be shown with low-level converting devices between the high-level primary patch bay and the low-level circuit patch bay. In cases where signals are low level from subscriber to the VFCT or to other subscribers, the circuit will be shown in the low-level bay only. Description of the circuit will include application of loop battery and hold battery, and show its point of connection in the circuit.

3.2.9 Modifications. Equipment to be modified to operate low level will be designated including VFCT, crypto, subscribers teletypewriter, and mux equipment. Modification kits required for the modification will be designated by NSN or manufacturer's type or model number. Other equipment requiring modification will be designated in the same manner.

3.2.10 Interface requirements. Because some circuits and/or equipment are being leased by the Government from commercial companies or foreign governments, modifications are not always possible. The C-E plan will show the internal requirements for these circuits or equipment. The interface requirements apply also to the mux substitution or for compatibility of standard to nonstandard equipment.

3.2.11 Security devices/equipment. The security requirements include the equipment used, access to the equipment, and radiation protection. These items will be shown in the C-E plan with a suggested method of meeting the requirements. Information on these requirements may be found in MIL-HDBK-232(C) and AR 530-4.

3.2.12 Alarms. The alarm requirements will be specified by the C-E plan including the number of lamp appearances, the logic of the activating signal and identified major and/or minor alarm. The alarm system will tell the controller what circuits are affected and to what degree (failure or degradation). Guidance for the alarm system is given in MIL-STD-188-310, section 5.4.3.

3.2.13 Intercommunication/order wire. The station orderwire system will be included in the C-E plan. It shall include the requirements of MIL-STD-188-310, section 5.4.4. The equipment to be used will be designated by quantity and type or module number. The intercom system requirements, in accordance with MIL-STD-188-310, section 5.4.2, will be included in the C-E plan. Additional information can be obtained from DCAC 310-50-6.

3.2.14 Power. The station power system will be defined in the C-E plan. The power system will include ac, 48 Vdc, and special power supplies for equipment requirements not covered elsewhere. The power equipment for the station shall include ac generators, commercial feeders (voltage and frequency), dc power supplies or rectifiers, power distribution bays, and the float battery where required. Power requirements are outlined in MIL-STD-188-310, section 5.4.5 and MIL-HDBK-411.

3.2.15 Distributing frame. The distributing frame location and size will be described by the C-E plan. Outside cable termination requirements will be included. A recommendation as to reuse of the existing frame or the addition of a new CCFB or conventional open frame will be made. This recommendation will include adding to existing frame, use of unused block space, or location of the new frame or CCFB. Frame space for future known projects and normal growth will be identified.

3.2.16 Grounding. The C-E plan will indicate the point of contact for grounding of the new or relocated equipment into the existing ground system. If no ground system exists or if the existing system is inadequate, the C-E plan will provide the location and method of installing the necessary equipment to assure good grounding throughout the technical control facility. For guidance on grounding, see MIL-STD-188-124 and DCAC 310-70-1.

3.2.17 Phased installation. A plan showing major sequence of events to place the new equipment or facility into operation is part of the C-E plan. Where it is necessary to install part of the equipment and place it into service before other equipment is installed, the C-E plan will identify this requirement giving a recommended approach. Other problem areas will be identified and solutions recommended. Step-by-step cutover procedure is not part of the C-E plan.

3.2.18 Wideband requirements. The wideband patch and test upgrade requirements shall be specified by the C-E plan. Requirements for wideband patch facilities are contained in MIL-STD-188-310, section 5.3, and MIL-STD-188-100. The C-E plan will specify the quantity and type of circuits; interconnect equipment; patch and test requirements;

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equipment impedances and signal levels for group, supergroup, and baseband requirements. The C-E plan shall designate the station standard and nonstandard mux equipment and the patch requirement for each.

3.2.19 Miscellaneous equipment. Equipment not normally classified as signal processing or testing will be designated by the C-E plan. Such items of equipment may be those necessary for battery testing and maintenance, hand tools, time and date stamp, time clocks, and other such items not available through normal requisition channels.

3.2.20 Site preparation arrangements. After the C-E plan has been completed and the site preparation requirements identified, an appendix to the site facility package will be prepared. The appendix will identify the tasks required to prepare the site for the upgrade. The appendix will be in parts, each part will address a specific operating element's responsibility, i.e., post or facility engineers, O&M command or subcommand. A schedule of major tasks/events will be included when possible. An agreement on the schedule will be reached between the TCIP project manager and the involved element.

3.2.21 Environmental equipment. The site preparations shall include the required upgrade of the air-conditioning, lighting, heating, and ventilation. It should be clearly stated if upgrade of the environmental equipment is included in or excluded from the technical control facility upgrade.

3.2.22 Outside cable plant and subscribers. The C-E plan will define the required upgrade of the outside cables connecting the subscribers with the technical control facility. This should be by drawing or by a chart where a chart will accurately depict the requirements. It should be stated whether the outside cable is to be upgraded as part of the technical control facility upgrade or if it is a separately funded project. Any changes to the subscriber equipment such as modifying of teletypewriters for low level operation will be defined in the C-E plan. The C-E plan will specify if this is required under the technical control facility upgrade or as a separate program.

3.2.23 Equipment removal. The C-E plan will specify what equipment is to be removed under the technical control facility upgrade and in what phase of the installation the removal will be made.

3.3 DETAIL ENGINEERING. This paragraph describes the requirements and provides guidance to the engineer responsible for the detail engineering of a technical control facility/PTF. The site survey and technical control facility site package hereafter will be referred to as planning documents. All installation drawings referred to may be found in section 4.

3.3.1 Definition of detail engineering. Detail engineering, as it applies to the installation of a technical control facility/PTF, is that phase of the engineering plan that reduces the site survey, engineering analysis, and C-E plan into a comprehensive set of drawings and instructions. This set of drawings and instructions provide the information required to configure a technical control facility/PTF into a design suitable to accomplish the function and mission for which it is intended. It also provides necessary information for test plan and cutover plan operation, to include active circuit rerouting plans, if such circuits are involved.

3.3.2 Equipment layout. USACEEIA drawing, COM-TC03-103, is a typical equipment floor plan; however, it is the responsibility of the detail engineer to provide an accurate layout for all equipment to be installed or relocated. The engineer must also consider the possibility of intermittent impulse noise entering the vf circuits. To isolate potential sources of impulse noise, it is recommended that equipment racks, 1.10 and 1.11, 2.21 and 2.22, and 3.13 and 3.14 be separated by the width of one equipment rack. When isolation is required, the equipment layout and row elevation drawings in section 4 will be revised accordingly.

3.3.3 Human engineering. The following human engineering factors should be considered when preparing the equipment layout drawing: working space in front and rear of the equipment, easy access to often used equipment, and noise level of equipment in or around the administrative area. Detailed information on human engineering is found in MIL-STD-1472B.

3.3.4 Row elevation. The row elevation drawing will show each bay in the row line up, the equipment to be mounted in each bay, and the equipment mounting position. Standard rack spacing reference charts will be drawn at each end of the row to show the position of the equipment within the bays. The equipment referenced on the elevation drawing and on all other drawings will be identified on the bills of material (BOM). The functional area will be shown, i.e., equal level patch area, high level TTY circuit monitor, etc. (See USACEEIA drawing, COM-TC03-104.)

3.3.5 Elevated floor (raised floor).

3.3.5.1 In some facilities the building overhead structure is not suitable for supporting the signal and power cable required. At these facilities the planning documents will specify the requirement for a raised floor.

3.3.5.2 USACEEIA drawing, COM-TC03-106, is a typical raised floor installation and is supported by three subdrawings: COM-TC03-107,

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supporting framing; COM-TC03-108, stringer layout and installation; and COM-TC03-109, tile layout and installation. The support framing drawing will provide support for the floor around the walls, columns, and stairways. The stringer layout and installation shows how to construct the grid support network for the floor tile. The tile layout shows any modification required to the tile for pipes, columns, etc.

### 3.3.6 Cable rack and power duct.

3.3.6.1 The cable rack drawings which show the cable rack installation can also show the power duct.

3.3.6.2 The drawings will show or call out all parts and hardware required to construct the required design. In areas where a construction detail is not clear, a blowup of that area will be included showing the materials and hardware in more detail.

3.3.6.3 Where the layout drawing would be too confusing to show both cable rack and power duct on the same drawings, separate drawings will be provided. USACEEIA drawings COM-TC03-110 and COM-TC03-111 show the layout in separate drawings. COM-TC03-110 shows a typical raised floor cable rack layout, COM-TC03-112 shows a typical ceiling support system, and COM-TC0-113 shows a typical bay supported system.

3.3.6.4 The overhead systems shown on the above drawings provide for the signal cable to be distributed over the side of the cable rack. This is the preferred method since it allows more flexibility for future additions and removal of bays and cable.

### 3.3.7 Bay installations.

3.3.7.1 Bay installation drawings show how to secure the various types of bays to the floor.

3.3.7.2 Some suggested methods and hardware used for various floors are shown on USACEEIA drawing, COM-TC03-105. Other methods are shown in USAF TO Series 31-10-2 thru 31-10-29.

3.3.8 Power distribution. The power distribution drawings include ac and dc power wiring from the distribution point to the using equipment. The following paragraphs will discuss the drawing requirements for the power distributions:

3.3.8.1 Wire size versus current carrying capabilities and number of conductors allowed in various sizes of conduit are contained in National Electrical Code handbook or USAF TO Series 31-10-2 thru 31-10-29.

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3.3.8.2 The power distribution drawings will consist of a running list which will contain the necessary information to identify fuse number, panel number, wire size and color, and the equipment to be connected.

3.3.8.3 Wiring details will be included for equipment supplied without instruction manuals, such as patch panels, alarm panels, and special fabricated equipment.

3.3.8.4 Some equipment may contain strapping options for two or more power sources. This equipment will be identified and the installers instructed to consult a strapping list (supplied by the detail engineer) or to consult the appropriate operations manual.

3.3.8.5 Typical power distribution drawing requirements are shown on USACEIA drawings, COM-TC03-114 and COM-TC03-115.

### 3.3.9 Signal cabling.

3.3.9.1 The cable routing drawing will show the route the cables will follow. The cable running list will provide cable number, number of pairs in cable, and terminating points. A typical cable running list format is shown in figure 3-1. The running sequence will show the sequence the cables are to be run and the cross-section drawing will show where each run is placed on the cable rack. Terminating details will be shown to assist the installers to fan and terminate each end of the cable. USACEIA drawing, COM-TC03-117, is an example of the signal cabling information.

---

FROM							TO			
Run	Cable	Pr.	Bay	Pnl	Gp	Function	Bay	Pnl	Conn	Remarks
1	1	51	1.16	2	A	Dc High Level Send	2.23	1	C1	Example

---

Figure 3-1. Sample format for cable running list.

3.3.9.2 Other drawings relating to cabling and terminating are COM-TC03-118, signal cable terminating; COM-TC03-119, interbay and miscellaneous patch panel wiring information; and COM-TC03-120, equipment interface information.

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### 3.3.10 Grounding.

3.3.10.1 The grounding consists of four separate ground systems plus ground box and plate. These systems are dc ground, cabinet or protective ground, shield ground, and signal ground. The dc ground system connects the positive (+) side of the 48-V power distribution equipment to the ground box. The cabinet ground system connects equipment cases and racks to the ground box. The shield ground system assures that all cable shields are grounded at the ground box. The signal ground system provides a common potential for all data circuits. The ground box is the interface point between the four separate ground systems and the ground plate.

3.3.10.2 The grounding drawings will consist of a layout diagram, grounding details, hardware to be used, and wire sizes. USACEEIA drawing, COM-TC03-116, is an example of a typical ground system.

3.3.11 Permanent cross connects. Permanent cross connects are performed at the permanent cross connects CCFB. This is the point where all miscellaneous panels, interbay panels, alarm display panels, and test equipment terminate.

3.3.11.1 Drawing, COM-TC03-119, detail A, shows how access to test equipment may be accomplished by more than one miscellaneous panel. Detail B is the schematic representation of the same circuit. The cross connect points must be identified for the running of the permanent cross connect. This is accomplished by a cross connect list shown in detail C. This cross connect list identifies the bay, panels, block, row, and pin of each end of the plug and cord set. In cases where special wiring is to be performed on a particular panel (example in detail D), a jumper list may be required. In addition to the circuits shown in detail D, others are shown in CCTP 105-50-6, chapter 3.

3.3.11.2 Interbay trunks are connected in much the same manner. Detail E illustrates a recommended interbay trunk arrangement for vf, but also can be used for dc. Detail F shows two common schemes for dc.

3.3.11.3 In a medium or large technical control facility, it may be necessary to install two interbay panels in each test bay to provide 8 percent of the total number of interbay trunks in use to be terminated at the QA test center as required by MIL-STD-188-310, section 5.6. NOTE: Testing of the cable, patch panels, and associated hardware must be performed before cross connecting, as the test equipment must use the CCFP for testing.



3.3.12 Master data list. A master data list (MDL) is a tabulation for all engineering drawings, documents referenced thereon, associated parts list and special lists, and specifications data lists pertaining to the installation/upgrade of the facility.

3.3.12.1 A recommended format for the MDL is shown in figure 3-2.

3.3.12.2 The numbers inside the circles are used as keys in the following explanation:

- ① MDL = drawing number assigned to MDL.
- ② Sheet of = sheet number of total.
- ③ Code ident = federal supplier code identification.
- ④ Auth = authorization or work order number.
- ⑤ Eng = engineer of project.
- ⑥ Project = name of project.

⑦ 1, 2, 3, 4, 5 = drawing level and sequences. This part of the MDL consists of five columns identified by numbers 1, 2, 3, 4, and 5. These numbers are used to indicate the level (number and types) of drawings required to build up a package of drawings for a particular project. Drawings listed under level 1 are first level drawings; therefore primary drawings, for example, the equipment layout drawing, COM-TC03-103, in section 4. This drawing indicates by symbol what level 2 drawings are required (listed in column of the MDL) to configure the site to the floor plan displayed by the primary drawings. Upon turning to level 2 drawing, it will again indicate a related level 3 drawing listed under column 3 on the MDL, etc., until levels 4 and 5 of the necessary drawings are reached. This system is a simple building-block-type process which can be easily followed by simply starting with a basic drawing.

### 3.3.13 Installation drawing corrections.

3.3.13.1 The installation team chief will make corrections to the engineering installation drawings as changes occur. Changes to the installation will be coordinated with the detail engineer. To prevent work stoppage, minor changes may be made to the installation by the team chief without prior approval. Minor changes are those that do not involve BOM changes, additional drawings, delay in completion time, cost, additional manpower, or coordination with other facilities or agencies. After change has been made or proposed, the affected drawing will be corrected to show the change in red pencil

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[illegible]

Figure 3-2. Recommended master data list format (sheet 1 of 3).

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[illegible]

Figure 3-2. Recommended master data list format (sheet 2 of 3).

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Figure 3-2. Recommended master data list format (sheet 3 of 3).

and returned to the detail engineer. The engineer will correct the original drawing, and then reissue, if requested, to the installation team. The installation team chief, upon receipt of the new corrected copy, will destroy the markedup copy and retain the corrected copy.

#### 3.3.14 As-built drawings.

3.3.14.1 Upon completion of the installation, the detail engineer is required to furnish the facility with drawings showing how the facility was installed and the equipment/services delivered. These drawings will be stamped as-built and dated, and will become a part of the station/facility records.

3.4 INSTALLATION INSTRUCTIONS. The installation instructions will assure that the installation will be done in accordance with established criteria. The installation instructions will provide the installation team with a sequence to the installation, assistance in interpreting the drawings, and guidance in planning the installation. The following paragraphs will assist the detail engineer in preparation of installation instructions.

3.4.1 Installation of an elevated floor. In most cases the floor will be installed under an repairs and utilities (R&U) contract, but in some cases, the installation team may be tasked to install the raised floor. There are several methods of assuring that the final floor is level. The following example is considered to be the best:

3.4.1.1 The installation team will need a 50-foot length of clear plastic tubing (PVC-105-1" Alpha Corp.) or equal, a chalk line, and tape measure.

3.4.1.1.1 Locate a reference line at the specified height (preferably at a high point) according to the installation drawings.

3.4.1.1.2 With both ends of the plastic tubing held above this reference point, fill the tube with water to the measured line (be sure no air bubbles are trapped in the tube).

3.4.1.1.3 Seal the ends of the tube.

3.4.1.1.4 With the reference end held at the original point, move the other end around the perimeter of the room and mark several points on the wall. Be sure the water is at the reference mark on each measurement. The water level can be moved up and down at the reference end by moving the other end of the tube up or down.

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3.4.1.1.5 Stretch a chalk line between the established points and snap a chalk mark around the entire room. This chalk line will be the reference line for the wall framing installation.

3.4.1.2 The final floor should be level within one-eighth of an inch.

3.4.1.3 The manufacturer's instructions should be followed for the grid and tile installation.

3.4.2 Floor layout. Methods of determining floor layout reference lines are covered in TO 31-10-9; however, the following procedure is given as additional information:

3.4.2.1 The floor layout or floor runner drawing contained in the installation drawing package will specify the dimensions required to locate the equipment on the floor.

3.4.2.2 The installation team will mark off the floor according to the dimensions given with chalk line and measuring tape.

3.4.2.3 During the layout of the floor, the installation team should verify that the equipment can be installed as specified by the drawings. In case of raised floor, the equipment bays should be installed on a single row of floor tile, allowing the row in front and rear to be removed for cabling and power wiring. If any discrepancy is noted by the installation team, the detail engineer should be contacted to resolve the problem.

3.4.3 Cable rack and power duct.

3.4.3.1 Cable rack and power duct layouts will be included in the installation drawings with details showing the different configurations to obtain the desired results.

3.4.3.2 The installation team will assure that all fasteners, anchors, and braces are properly installed and that proper hardware is being used.

3.4.3.3 USACEEIA drawings, COM-TC03-110 through COM-TC03-113, show typical cable rack and power duct installation details. The bay supported layout in drawing COM-TC03-113 requires no special fabricated devices and may be cut to size onsite from standard lengths of stock.

3.4.4 Equipment installation.

3.4.4.1 Care should be taken during the installation of the equipment to assure a straight, level lineup. It may be necessary to shim up the floor runner during installation to assure a level row.

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3.4.4.2 The bays will be installed according to the drawings provided. Bays placed side by side will be bolted together at top and bottom using star washers to assure good ground contact between bays, bolt, and nut. See detail A of USACEEIA drawing, COM-TC03-116.

3.4.5 Power wiring.

3.4.5.1 The power wiring installation drawing package provides a cable running list which identifies the distribution panel, main breaker amperage, individual circuit breaker assignment, circuit breaker amperage, cable type, conductor size, conductor color, and equipment to be connected by location.

3.4.5.2 The main power distribution duct system will be constructed of a square metal duct to accommodate branch feeders. Branch feeders will be dropped from the main distribution duct by means of a thin wall of flexible conduit and secured in the appropriate position to easily allow proper connection to the equipment.

3.4.6 Signal cabling. The drawings provided with the installation package will contain information necessary for the installation team to run and terminate the signal cable. These drawings will consist of the running list, routing diagrams, cross sectional drawings of how the cable bundle will be placed on the cable rack, and terminating information. The installers will be required to butt, lace, and tag the cables with appropriate information to allow easy identification. Assure that the cables are routed and terminated properly, good mechanical and electrical connections are made, and the joints are neat and orderly. Drawing number COM-TC03-118 is a typical drawing required.

3.4.7 Grounding. The ground system consists of a ground plate, ground box, and four separate ground buss cables. The installation team will normally be required to install the ground box at a location that will allow the shortest cable run to the ground plate. From the ground box, four separate large cables are run as specified by the layout diagram. Wire sizes will be shown on the layout diagram. All connections should be made with care to provide a good electrical contact.

3.4.8 Permanent cross connects. Permanent cross connects are performed after testing of the site has been completed. Permanent cross connects consist of the cross connecting of the interbay and miscellaneous panels, alarms, intercom's, and orderwire panels. The equipment and cross connecting information will be supplied as part of the installation drawing package.

3.5 CUTOVER. Cutover is performed after the installation is complete and the site has been tested. It is also helpful if the permanent cross connects have been run. Cutover is the operation that puts the new equipment and circuits into service. The cutover plan translates DCA technical orders to engineered circuits and assigns terminal blocks, pins, conditioning equipment, etc, by number.

3.5.1 Responsibilities. The O&M commander and his representatives are responsible for preparing the cutover plan and supervision of the cutover. The performance of the cutover may be prescribed by the contract or other binding project documents to be accomplished by the installation team, O&M commander, or by a joint effort. The joint effort has advantages since the installation team is familiar with the scheme used in wiring the facility, and the operational personnel are familiar with the circuit order requirement. Another advantage that the joint effort offers is that if problems are uncovered during cutover, the installation team is available to help resolve the problem.

3.5.2 Cutsheet. A variety of cutsheets are in use at different sites, and any cutsheets that meet the requirements are acceptable. Figure 3-3 is a sample of the type recommended. The cutsheet will assign pin number, module number, and bay number to all wiring that must be performed during cutover. It assigns the conditioning equipment required and the string number according to MIL-STD-188-310. It also designates the jack circuit where each end of the string appears. This cutsheet then becomes part of each station's permanent record.

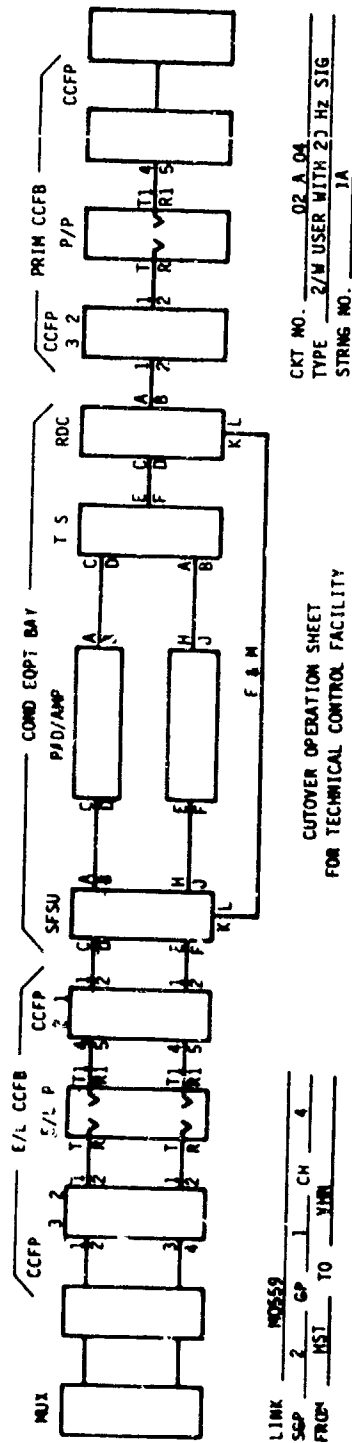
3.5.3 Cut devices. The responsible party preparing the cutover plan may wish to use a mechanical/electrical device to assist in the cutover. Such a device is called a cut switch and allows the circuit or circuits to be transferred from one (old) path to a new path with a minimum of downtime for the circuit.

3.5.3.1 The cut switch is nothing more than a toggle switch with the number of poles required, i.e., two-pole for 2-wire circuits, four-pole for 4-wire circuits, etc. The switch is wired into the circuit at the point where the circuit path is to be switched.

3.5.3.2 The use of a cut switch is shown in figure 3-4. After the cutover of the circuit has been made, the switch and jumpers installed for cut purposes may be removed. With such a device, either one or several circuits at a time can be transferred, depending on the number of poles the switch contains.



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FROM				TO			
EQUIP DEG	CCFP BAY/MOD/CP	PIN	REMARKS	EQUIP DEG	CCFP BAY/MOD/CP	PIN	REMARKS
3.1 SH 1	2.21-3-A	1 & 2	2/W DROP	Prim PAT	2.21-2-A	1 & 2	2/W AUDIO
	2.21-2-A	4 & 5	2/W DROP	Prim PAT	2.21-1-A	1 & 2	SUB CABLE
3.1 SH 2	1.01-1-A	1 & 2	Send Line	E/L PAT	1.01-2-A	4 & 5	4/W SEND
	1.01-2-A	1 & 2	Send Line	E/L PAT	1.01-3-A	1 & 2	MUX CABLE
	1.01-2-B	1 & 2	Rec Line	E/L PAT	1.01-2-B	4 & 5	4/W REC
	1.01-2-B	1 & 2	Rec Line	E/L PAT	1.01-3-B	3 & 4	MUX CABLE

Figure 3-3. Sample cut sheet format.

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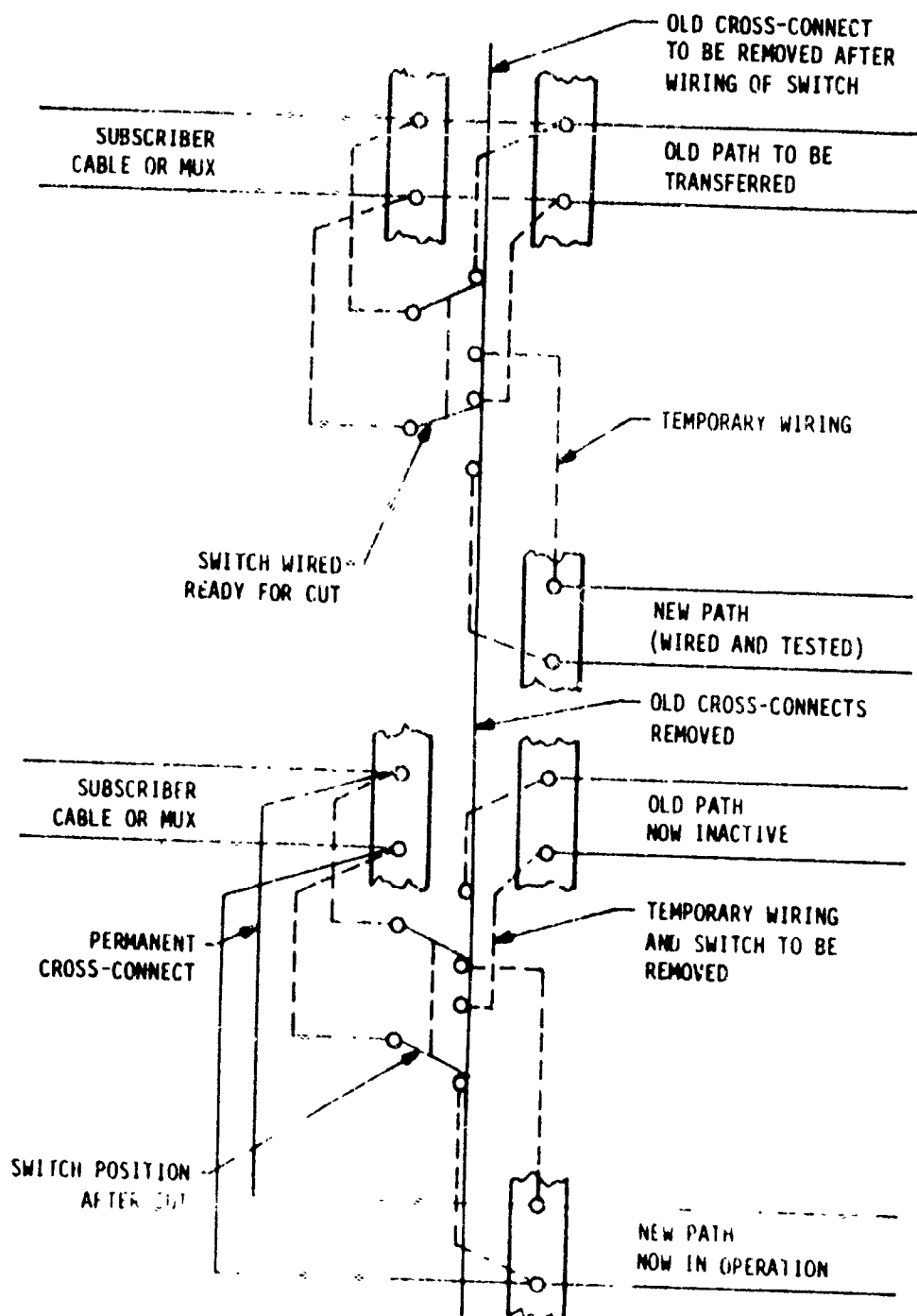




Figure 3-4. Cut switch.

#### SECTION 4. ENGINEERING INSTALLATION DRAWINGS

4.1 GENERAL. The typical drawings in this section are applicable to the installation of a technical control facility/PTF, and furnish guidance and standard engineering data to be used in the development of an engineering installation package (EIP). When required, it may be necessary to modify a typical drawing or delete portions in order to meet site requirements or configuration which may differ from site to site.

4.1.1 Drawings will be prepared in accordance with MIL-STD-100 and MIL-D-1000. Abbreviations will be in accordance with MIL-STD-12. If abbreviations used are not contained in MIL-STD-12, they will be spelled out the first time used and the abbreviation will follow in parentheses. Refer to CCCR 34-3 for detailed information on engineer drawings.

4.1.2 Notes will appear on the sheet to which they apply and will be numbered in a triangular frame, i.e., . This symbol will also depict the level of related drawings required for a particular project layout.

4.1.3 BOM items will be numbered in a circle or balloon, i.e.,  with leader lines pointing to the part being numbered.

4.1.4 The number assigned to an item on the drawing will correspond to a BOM item number; therefore, like items will have the same number throughout the drawing package.

4.1.5 Sheet number one of a multiple sheet drawing will contain a list of the materials shown on all sheets of that drawing. A cover sheet may be added to satisfy this requirement.

4.1.6 The first drawing sheet of the drawing package will contain an index list of the installation drawings contained in the drawing package. This installation drawing index will be given a drawing number for reference purposes, storage, and retrieval.

4.2 US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY DRAWINGS. The referenced drawings listed below are included as foldouts at the end of this section. Microfilm copies or blowups are available from the Commander, US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP, Fort Huachuca, Arizona 85613.

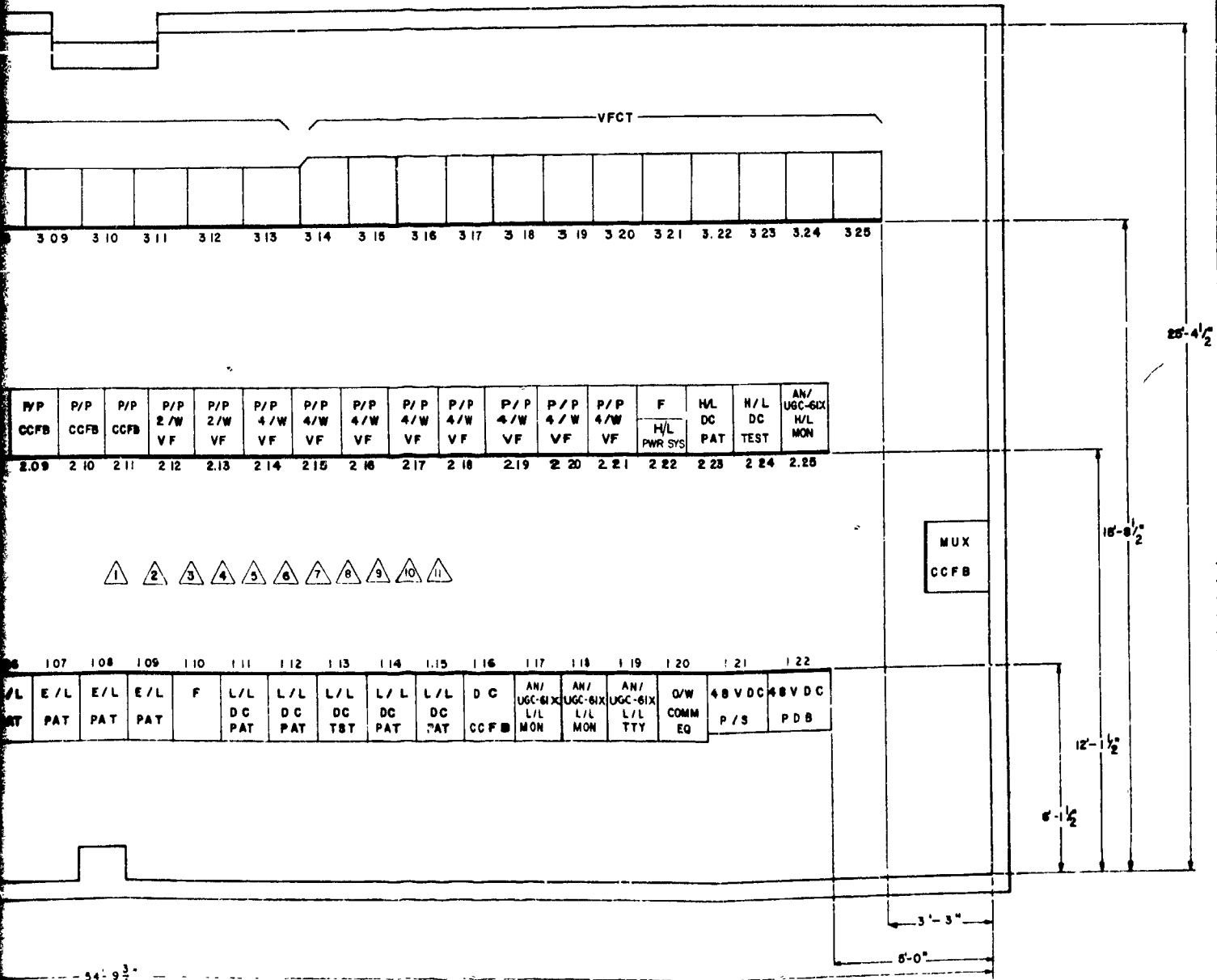
COM-TC03-103 (1 sheet)      Equipment Layout (Floor Plan)

COM-TC03-104 (6 sheets)      Typical Row Elevation

COM-TC03-105 (3 sheets)	Typical Bay Installation
COM-TC03-106 (1 sheet)	Raised Floor Installation
COM-TC03-107 (2 sheets)	Support Framing Layout
COM-TC03-108 (1 sheet)	Stringer Support Installation
COM-TC03-109 (1 sheet)	Floor Tile Installation
COM-TC03-110 (1 sheet)	Underfloor Cable Rack Installation
COM-TC03-111 (1 sheet)	Ac and Dc Power Duct Installation (Elevated Floor)
COM-TC03-112 (3 sheets)	Ceiling Supported Cable Rack and Power Duct Installation
COM-TC03-113 (5 sheets)	Bay Supported Cable Rack and Power Duct Installation
COM-TC03-114 (5 sheets)	Ac Power Wiring
COM-TC03-115 (6 sheets)	48 Vdc Power Distribution
COM-TC03-116 (2 sheets)	Typical Grounding System
COM-TC03-117 (3 sheets)	Signal Cable Routing Diagram
COM-TC03-118 (13 sheets)	Signal Cable Terminating Details
COM-TC03-119 (2 sheets)	Interbay and Miscellaneous Panel Wiring Details
COM-TC03-120 (5 sheets)	Equipment Interface Wiring



5	4	3	2	1	
REVISIONS					
SYM	ZONE	DESCRIPTION		DATE	APPROVED
A		CHANGED EQUIP 2.25, 1.20		1 NOV 76	TC



COM-TC03-104
COM-TC03-106
COM-TC03-110
COM-TC03-111
COM-TC03-112
COM-TC03-113
COM-TC03-114
COM-TC03-115
COM-TC03-116
COM-TC03-117

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
ORGANIZATION USACEEIA-CED FORT MONTECALA, ARIZONA				
EQUIPMENT LAYOUT (FLOOR PLAN)				
DESIGN BY MR. JIM RAMEY				
DRAFTSMAN SP6 L. A. KAUFMAN				
CHECKER				
DATE 10 OCT 1975				
ORGANIZATION APPROVAL				
TC03-101		SEIP 006		
CODE IDENT NO.		SIZE		
50470		D		
COM-TC03-103				
SHEET OF				

1940s 1950s Government drawings, specifications, or other data are used in any process other than in connection with a definitely related government procurement operation, the United States Government thereby incurs no responsibility for any obligation whatsoever and the fact that the Government may have transmitted, furnished, or in any way supplied the said drawings, specifications, or other data, is not to be regarded by implication or otherwise as in any manner granting the holder or any other person or corporation, or conveying any rights or considerations in manufacture, sale, or use any patented invention that may in any way be related thereto.

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
A		REVISED AND REDRAWN	8 NOV 78

172	235648	BALLAST LAMP PANEL, BLP-508, 60V DC			
159	00558H	NUT, HEX, 1/4-20 UNC, STL, CAD PLTD			
158	08768A	WASHER, FLAT ROUND, 1/4" NOM ID, STL, CAD PLTD			
157	23551Z	SIDE PANEL SLOPING FRONT, 9400-25-LH			
98	23497A	POWER MONITOR PANEL SAAD-D-40599			
73	23473J	METERING PANEL TYPE 310 MOD I			
72	02581Y	3/4" TRADE SIZE FLEXIBLE CONDUIT	5975-00-178-1223		
71	23472K	PLUGMOLD 20DB106 1' LONG			
70	23473J	HEX HEAD MACHINE SCREW 1/4"-20 X 3/4" LONG, STEEL, CADMIUM PLATED	5305 00-068-0502		
69	23278B	ALUM ANGLE 2 1/8 X 2 1/2 X 1/8" THK, 9081-T8			
68	23277A	SCREW, PAN-HEAD SELF TAPPING NO 8 X 1/2", STEEL, CADMIUM PLATED			
67	05290Q	STRAIGHT BOX CONNECTOR 5533			
65	23276Z	PLUGMOLD 8208506	5935-00-189-2039		
64	23275J	EQUIPMENT DRAWER ED1000 7-18			
63	23274K	EQUIPMENT DRAWER ED1000 3-18			
62	23273L	SLIDING DRAWER W/LIFT TOP LTD 1918			
61	23272M	BLANK PANEL, P-15			
60	23271N	BLANK PANEL, P-21			
59	23270Y	SIDE PANEL PLAIN BALL CORNER 3100-25			
58	23269D	SIDE PANEL SLOPING FRONT, 9400-25 RH			
57	23268C	EQUIPMENT RACK F400-25			
56	23267B	WORK/Writing TOP OPT-345			
55	23266A	EQUIPMENT RACK F100-25			
54	23265Z	SPEAKER ASSEMBLY 6505-3828	9801-01-017-5743		
53	23264J	LINK 3/W TA-923/FSC	5805-00-289-0320		
52	17273Q	EXPRESS-LINK-LOCAL 1/W TA-923/FSC	5805-00-289-0027		
51	23263K	EXPRESS-LINK-LOCAL 1/W OAU TA-923/FSC	5805-00-289-0323		
50	23262L	PC CARD RACK ASSEMBLY LCC 9740			
49	19360J	SHELF, MT6 41010-98			
ITEM	AEL	DESCRIPTION	NSN	UI	QTY

48	23261M	FUSE PANEL SB-3751/FSC PVO Q/W			
47	01435E	LOOP RESISTOR PANEL SB-1642	5815-00-086-8353		
46	23259E	DIGITAL LINE INTERFACE UNIT, CCC-75063			
45	11468F	POWER SUPPLY MODULE 2222A	6130-01-015-9447		
44	23260N	FUSE PANEL 135B (120 OR 60V)			
43	23257C	DC HIGH LEVEL PATCH PANEL 9END, CCC-75060			
42	06428D	TELEPHONE PULSE TEST TT-26-BLDR	5805-00-070-1063		
41	17855Z	BRIDGE, ZM-74U	6625-00-167-9861		
40	23258B	HP-3550B TRANSMISSION MEASURING SET	6625-00-244-3032		
39	17675K	RECORDER R0458VIU	6625-00-463-6042		
38	12947A	OSCILLOSCOPE, TYPE AN/USM-281C	6625-00-105-9622		
37	17677Z	RECORDER R0460VIU	6625-00-464-2907		
36	13400B	TS-2668/86M ENVELOPE DELAY MS	6625-00-128-0217		
35	18676K	HP-3591A FREQUENCY SELECT VM	6625-00-450-0532		
34	17641L	HEKIMIAN 490U PHASE METER	6625-00-006-7226		
33	17789A	HP 5300A/5302A FREQUENCY COUNTER			
32	17735C	GENERATOR, SIGNAL PL1285U	6625-00-479-4699		
31	23255A	TTS-58AR IMPULSE NOISE MEASURING SET	6625-00-140-7389		
30	09220M	TEST SET NOISE LEVEL, TS 3171/U	6625-00-133-7469		
29	12987G	MULTIMETER ELECTRONIC TYPE, AN/USM 224	6625-00-777-4706		
28	01813W	FUSE PANEL SB1523/VFT	5820-00-801-8014		
27	22151L	ALARM DISPLAY PANEL, CCC-75051			
26	08712Z	BLANK PANEL 3 1/2" EMCOR PNA	5975-00-688-2541		
25	02451K	BLANK PANEL 10 1/2" EMCOR PNA 10	5975-00-234-4868		
24	23253J	EQUIPMENT RACK (TESTING), CCC-75054			
23	02406M	BLANK PANEL 7" EMCOR PNA 7	5975-00-665-8791		
22	19364P	MULTIMETER 269			
21	09298Q	POWER SUPPLY 676D 6V	5905-00-103-7136		
20	23254Z	SPEAKER PANEL, CCC-75061			
19	14323A	WORK/Writing SHELF RS-18H			
18	22040M	PANEL, AC RECEPTACLE ASSEMBLY			
17	10533F	BLANK PANEL 8 3/4" EMCOR PNA 8	5975-00-688-2541		
16	09026H	BLANK PANEL 5 1/4" EMCOR PNA 5	5820-00-170-4547		
15	00879Z	BLANK PANEL 1 3/4" EMCOR PNA 1	5975-00-807-4683		
14	18601Z	48 LAMP INT/BAY PATCH PANEL, CCC-75052			
13	23252K	FUSE PANEL 135C 6V			
12	06288M	AN/68M-15 VI TTY TEST SET	6625-00-464-1702		
11	17665J	VOLTMETER, ELECTRONIC TYPE ME-303/AMU	6625-00-421-7382		
10	23251L	POWER DISTRIBUTION BAY, CCC-75065			
9	18912B	DC PATCH PANEL LOW LEVEL SEND, CCC 75068			
8	23250M	48V DC POWER SUPPLY, CCC-75064			
7	23249P	MISC PATCH PANEL, CCC-75049			
6	23247D	INTERBAY PATCH PANEL, CCC-75048			
5	23248E	AN/USC 61X TELETYPEWRITER SET	5815-00-123-2041		
4	21684E	VF PATCH PANEL, CCC-75047			
3	22035B	EQPT RACK, PATCHING, CCC-75050			
2	19362R	CIRCUIT CONCH FRAME BAY, CCC-75067			
1	23494K	STATUS REPORTING CONSOLE			
ITEM	AEL	DESCRIPTION	NSN	UI	QTY

1	2	3	4	5	6	7	8	9	10
A	A	A	A	A	A	A	A	A	A
SHEET NUMBER									
REVISION STATUS OF SHEETS									

NEXT ASSEMBLY		USED ON	
DWG INDEX NO.			

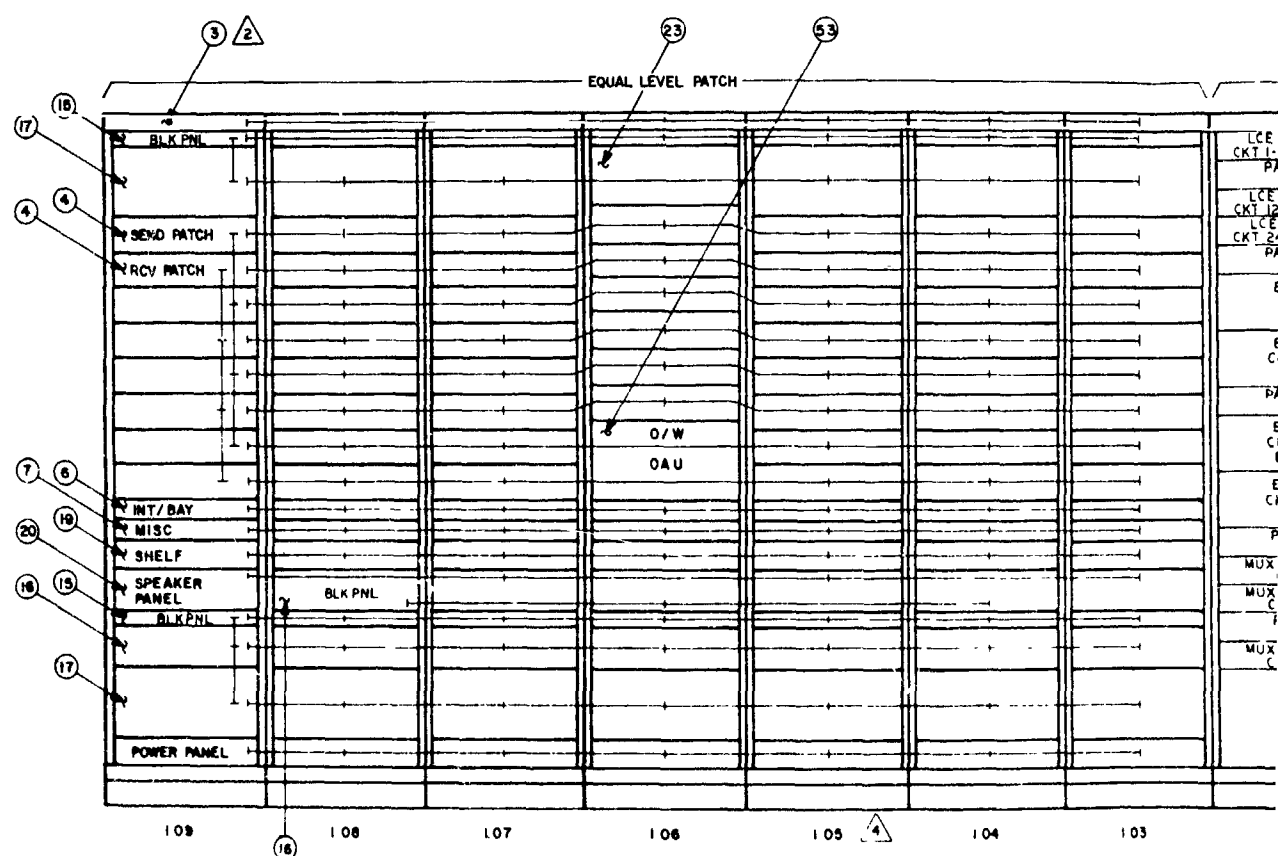
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DESIGNED BY	NAME	DATE	
DRAWN BY	NAME	DATE	
CHECKED BY	NAME	DATE	
APPROVED BY	NAME	DATE	
DESIGN ACTIVITY CCC CED RET		TYPICAL ROW ELEVATION	
SIZE	PAGE NO	DRAWING NO	
D	50470	COM-TC03-104	
BLK	NONE	1	OF 6



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D

C



- ① ○ INDICATES BOM ITEM NUMBER
- ② VF PATCH BAY EQUIPPED CEEIA SPEC CCC-75046
- ③ SEE SHEET 6 (SAME DRAWING NUMBER)
- ④ TYPICAL BAY INSTALLATION, COM TC03-105

5

4

3

2

1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

②

E/L CCFB

LCE 4/W LINE  
CKT 1-120 BAY 3.04  
PATCH CORD  
TROUGH

LCE 4/W LINE  
CKT 121-240 BAY 3.05  
LCE 4/W LINE  
CKT 241-360 BAY 3.06  
PATCH CORD  
TROUGH

E/L PATCH

CKT 1-96

BAY 106

E/L PATCH

CKT 97-192

BAY 107

PATCH CORD

TROUGH

E/L PATCH

CKT 193-288

BAY 108

E/L PATCH

CKT 289-384

BAY 109

PATCH CORD

TROUGH

MUX/DEMUX TIE

CKT 1-120

MUX/DEMUX TIE

CKT 121-240

PATCH CORD

TROUGH

MUX/DEMUX TIE

CKT 241-360

LCE LINE CKT 1-120  
BAY 3.07-3.10  
PATCH CORD  
TROUGH

LCE LINE CKT 121-240  
BAY 3.11-3.13  
E/L PATCH

CKT 1-96

BAY 103

PATCH CORD

TROUGH

E/L PATCH

CKT 97-192

BAY 104

PATCH CORD

TROUGH

E/L PATCH

CKT 193-288

BAY 105

PATCH CORD

TROUGH

MUX/DEMUX TIE

CKT 1-120

MUX/DEMUX TIE

CKT 121-240

PATCH CORD

TROUGH

VFCT VF LINE

BAY 3.14-3.25

①

③

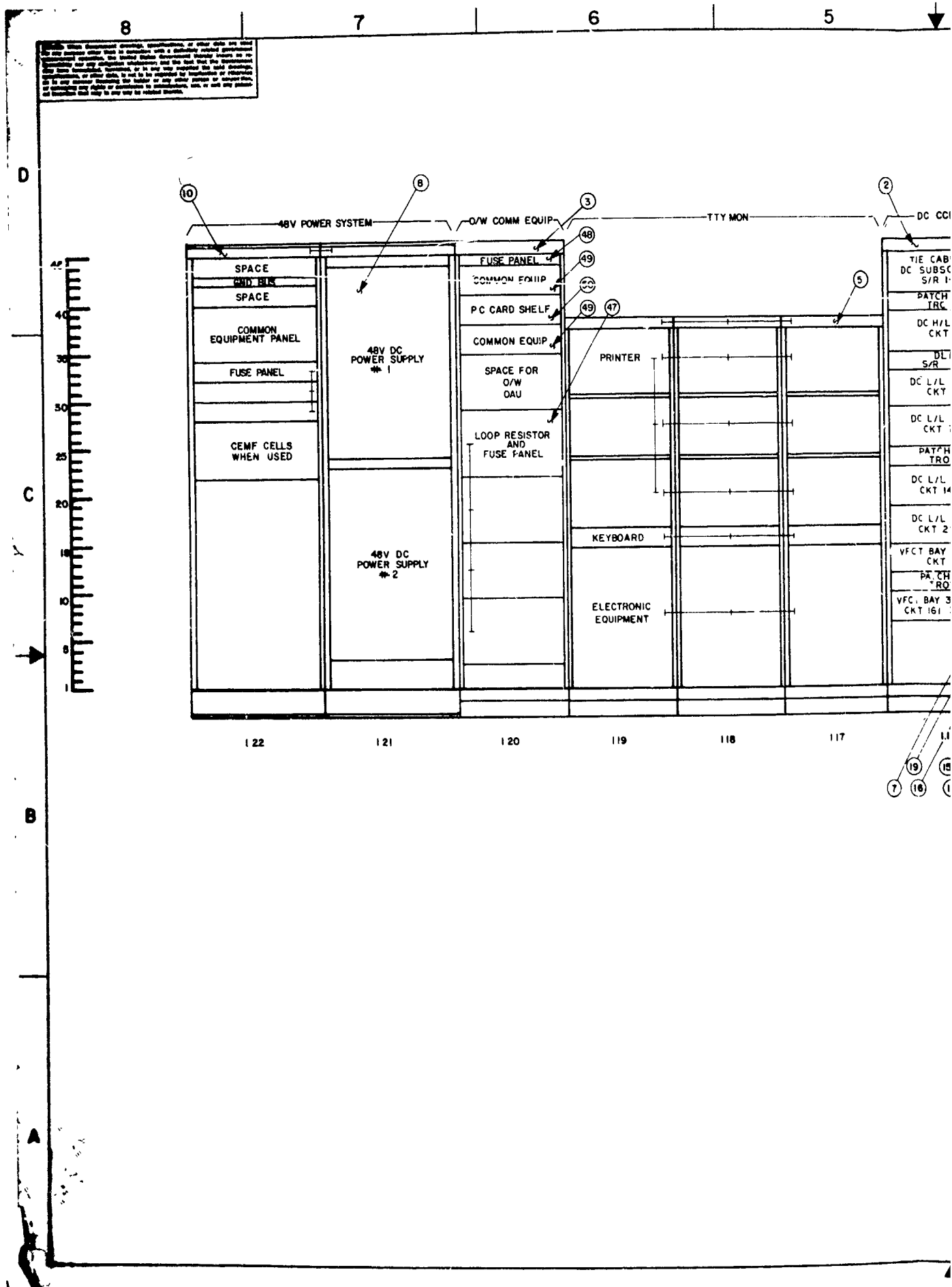
STATUS REPORTING CONSOLE

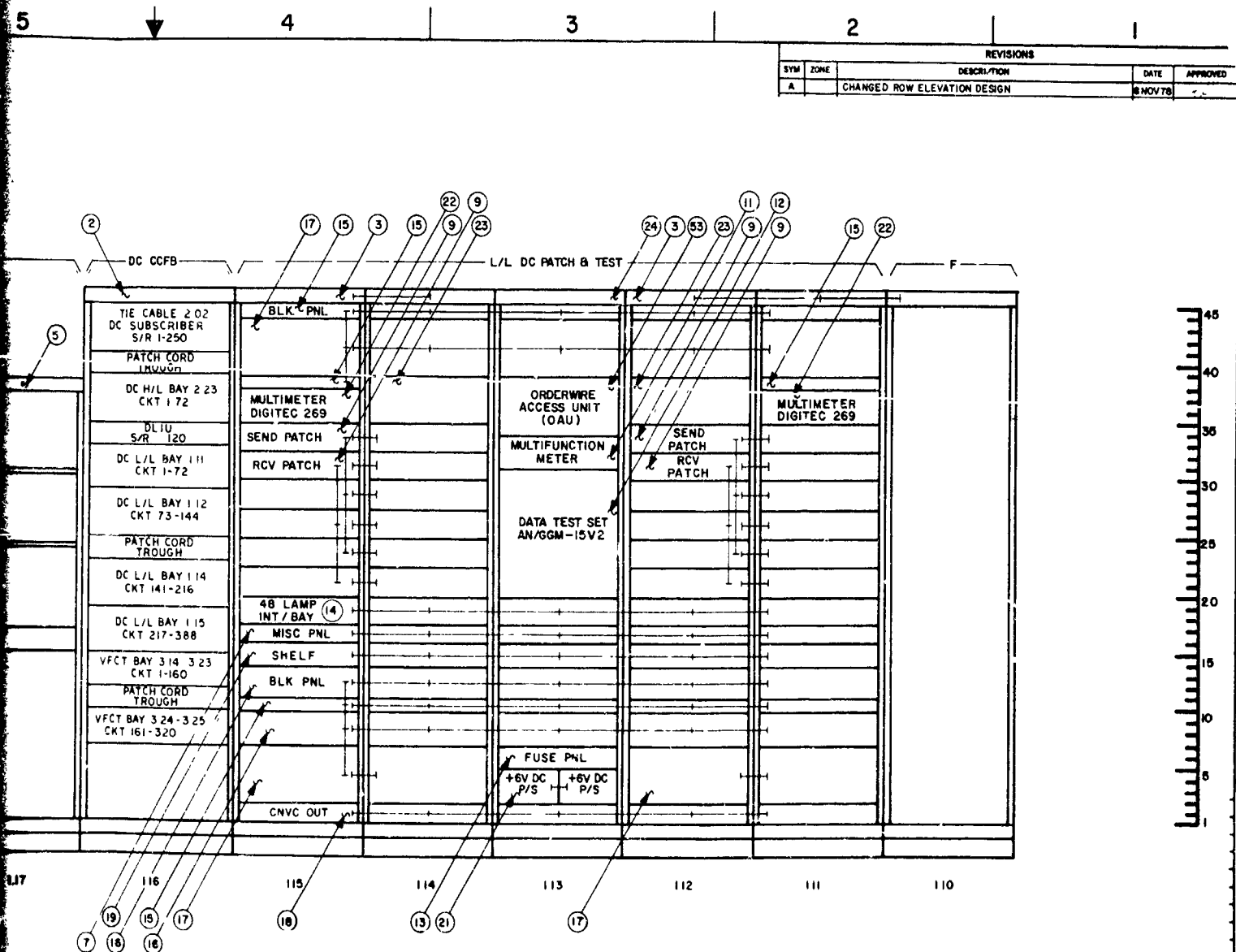
103

102

101

ITEM	DESCRIPTION	FSN	UI	QTY			
LIST OF MATERIALS							
DESIGN BY MR JIM RAMEY		ORGANIZATION USACEEIA-CED FORT HUACHUCA, ARIZONA					
DRAFTSMAN SP6 L A RAUFMAN		TYPICAL ROW ELEVATION					
CHECKER - <i>[Signature]</i>							
DATE 9 OCT 1976							
ORGANIZATION APPROVAL		CODE IDENT NO 50470	SIZE D	COM-TC03-104			
APPROVAL		SCALE 1/32" = 1"	SHEET 2 OF 6				





ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
DESIGN BY MR JIM RAMEY		USACEEIA-CED		
DRAFTSMAN S-6 L A KAUFMAN		FORT HUNTER, ARIZONA		
CHECKER		TYPICAL ROW ELEVATION		
DATE 10 OCT 1978		COM-TC03-104		
ORGANIZATION APPROVAL		CODE IDENT NO	SIZE	
APPROVAL		50470	D	
		SCALE 3/32"=1"	SHEET 3 OF 6	

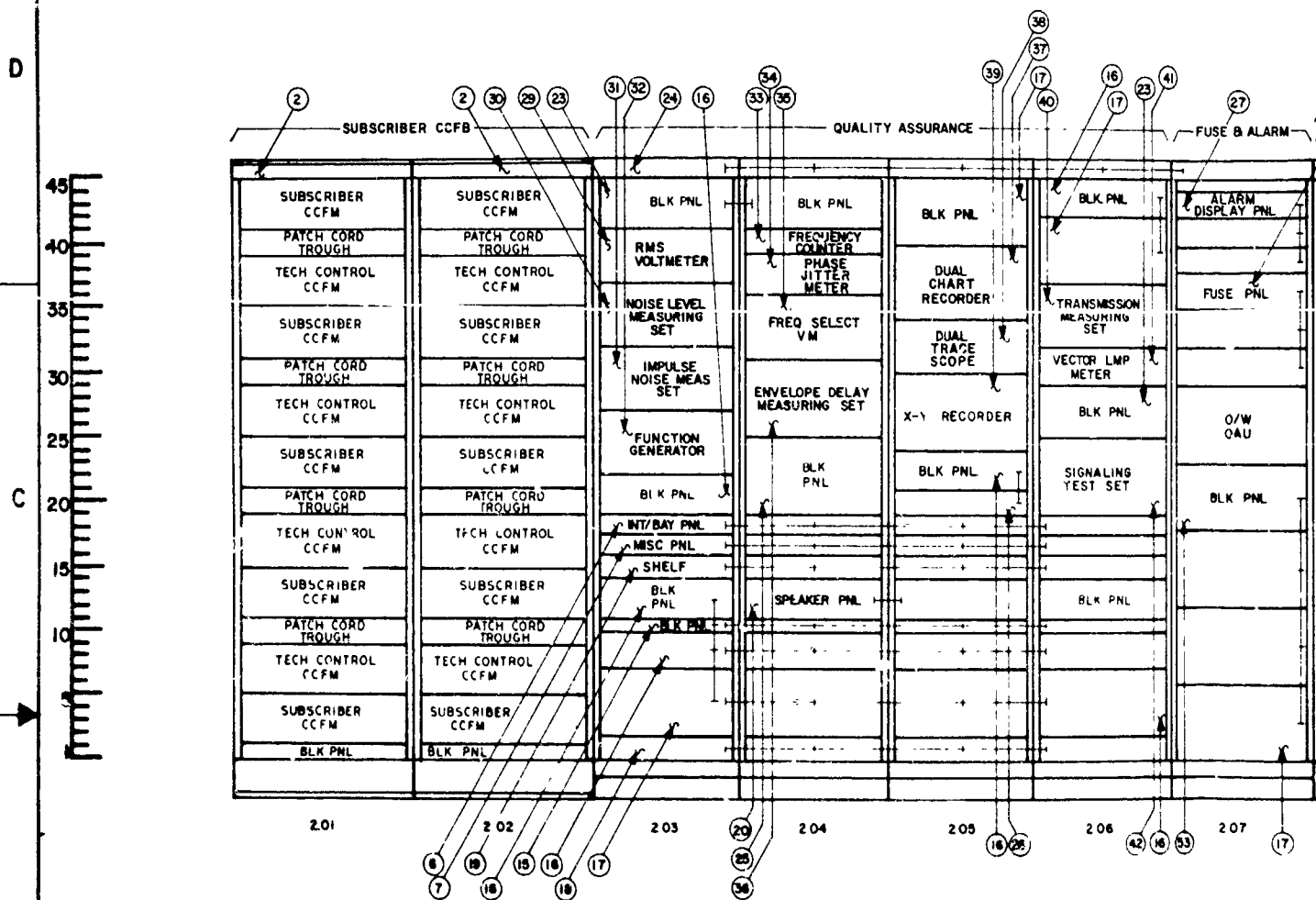
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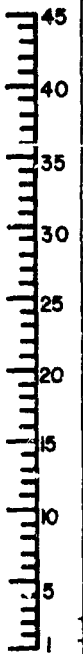
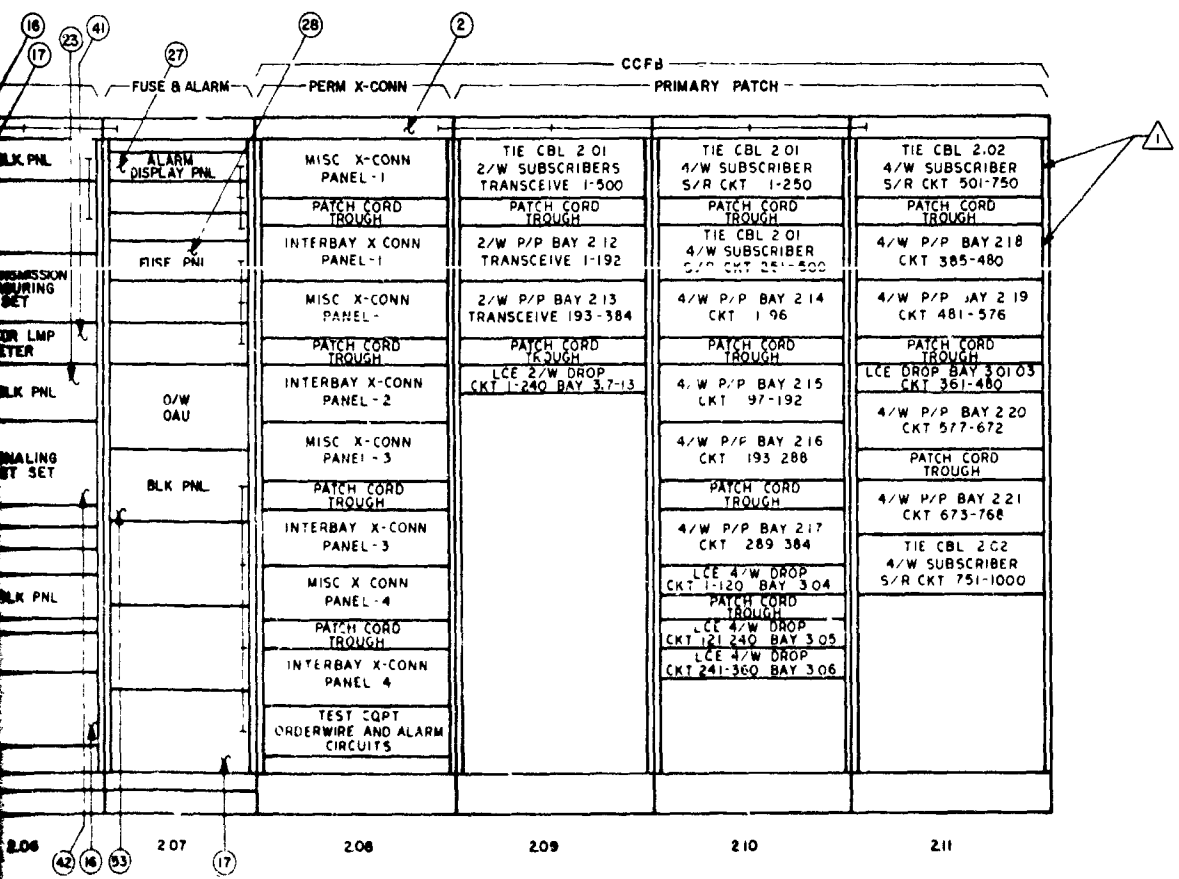
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CIRCUIT CONCENTRATION FRAME MODULES ARE DESCRIBED  
IN CEEIA SPEC CCC-75068

5 4 3 2 1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

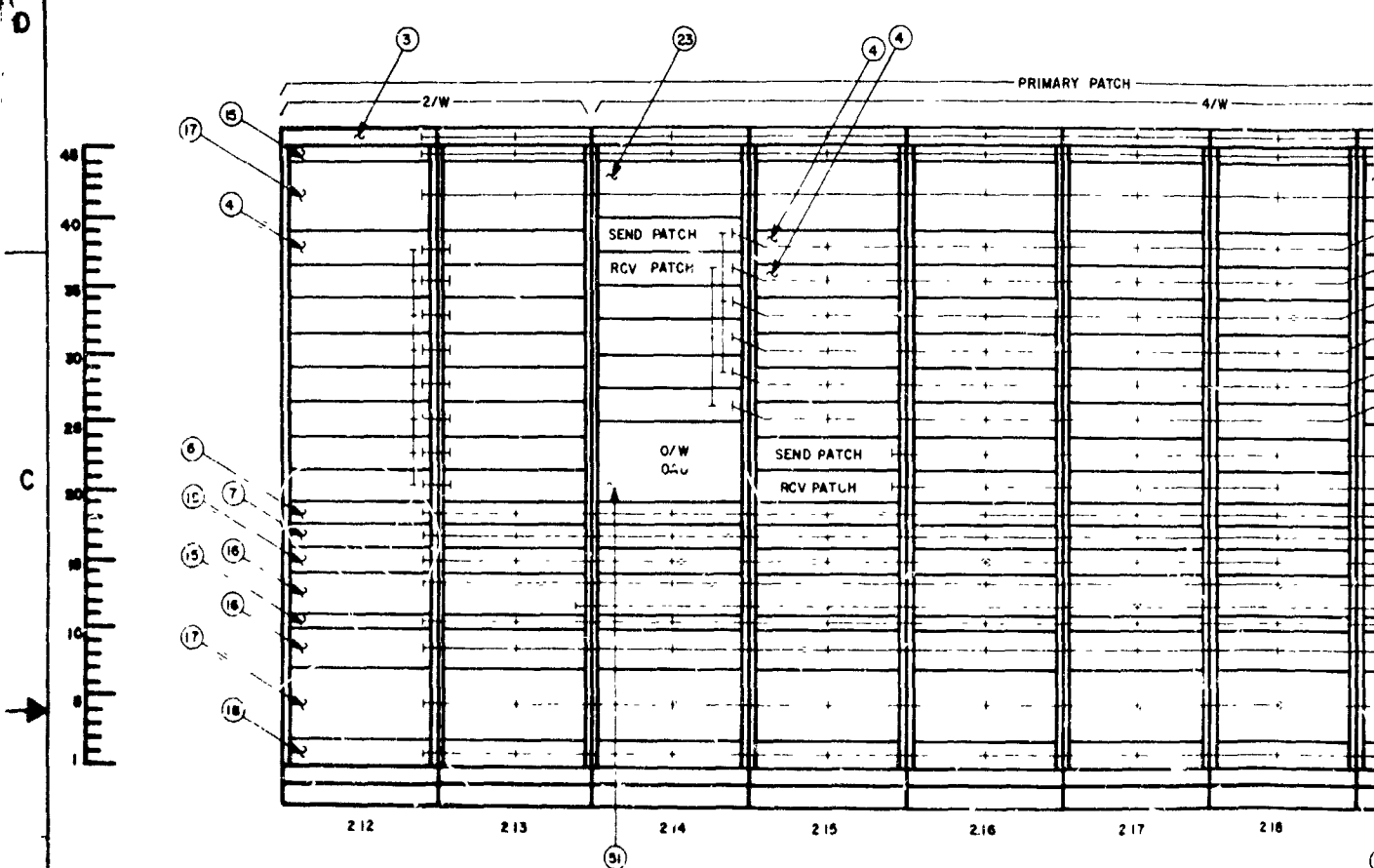


206 207 208 209 210 211

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
ORGANIZATION USACEEIA-CED FORT HANCOCK, ARIZONA				
DESIGN BY: MR. JIM RAMEY				
DRAFTSMAN: SPS L.A. KAUFMAN				
CHECKER: <i>[Signature]</i>				
DATE: 10 OCT 1975				
ORGANIZATION APPROVAL: <i>[Signature]</i>				
APPROVAL: <i>[Signature]</i>				
CODE: 50470		SIZE: D	COM-TC03-104	
SCALE: 3/32"=1"		SHEET 4 OF 6		

TYPICAL ROW ELEVATION

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5

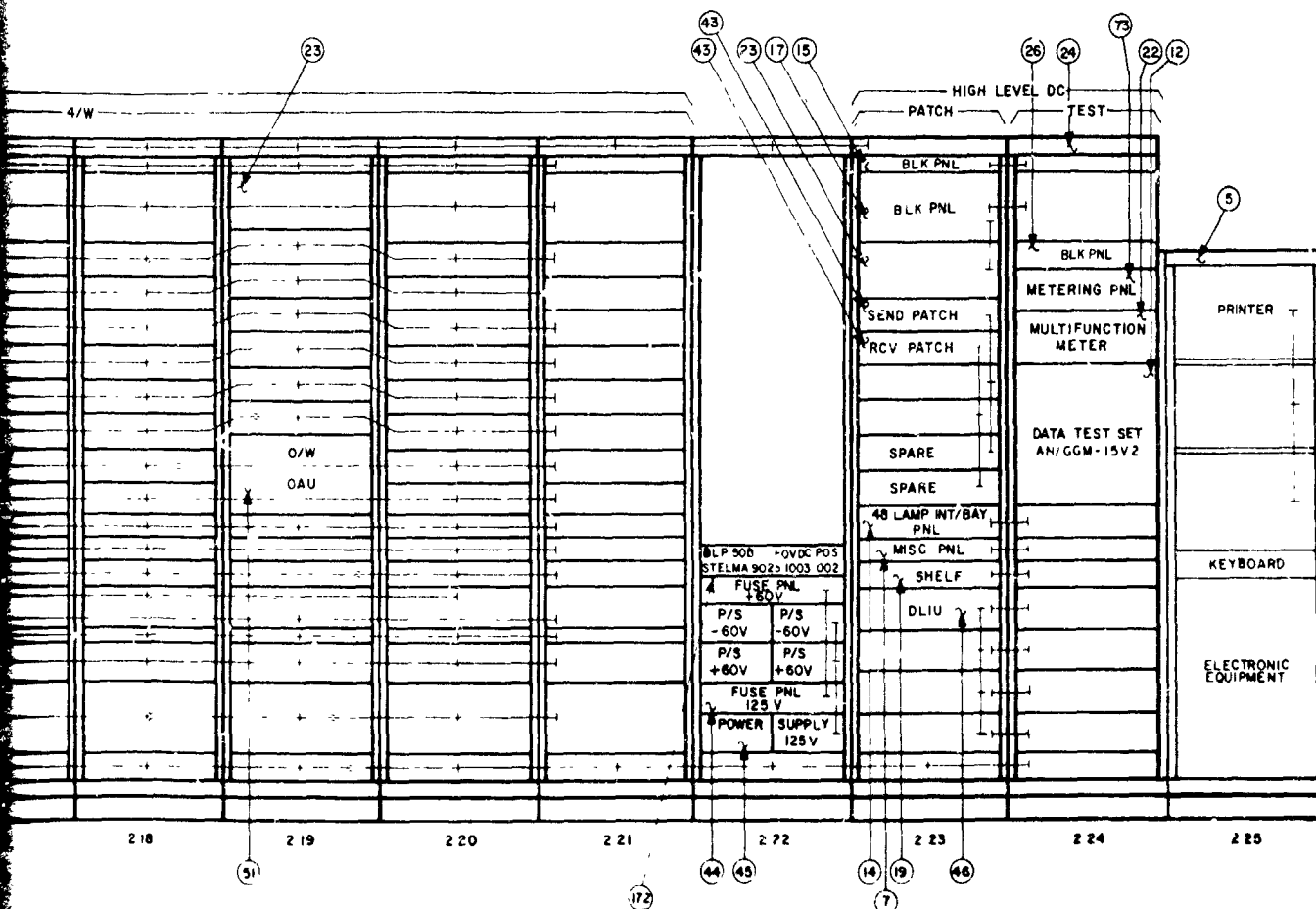
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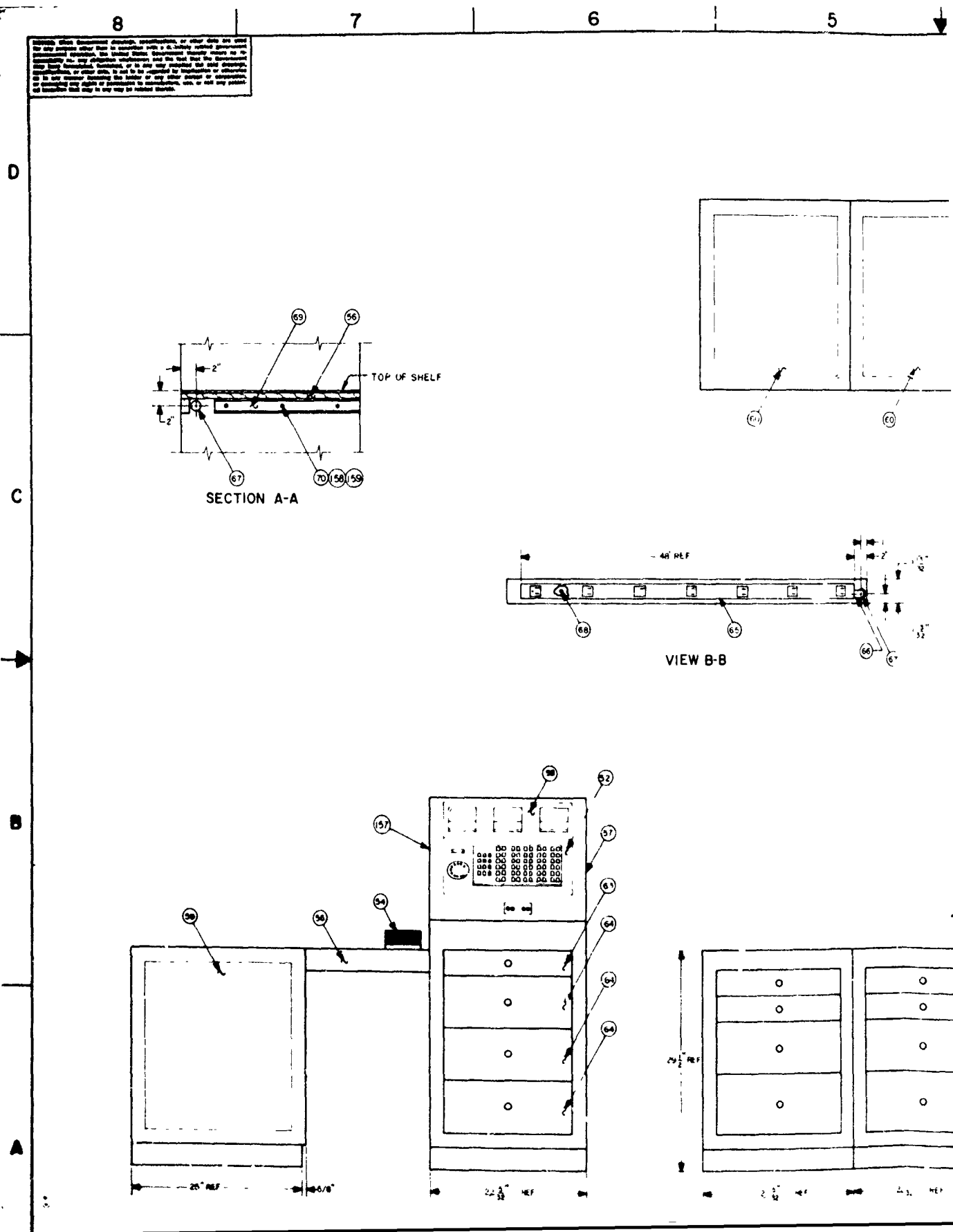
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		CHANGED ROW ELEVATION DESIGN	8 NOV 78	



ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
DESIGN BY MR. JIM RAMEY		USACEEIA-CED		
DRAFTSMAN SP6 L.A. KAUFMAN		PORT HURON, MICHIGAN		
CHECKER		TYPICAL ROW ELEVATION		
DATE 10 OCT 1978				
ORGANIZATION APPROVAL		COM-TCO3-104		

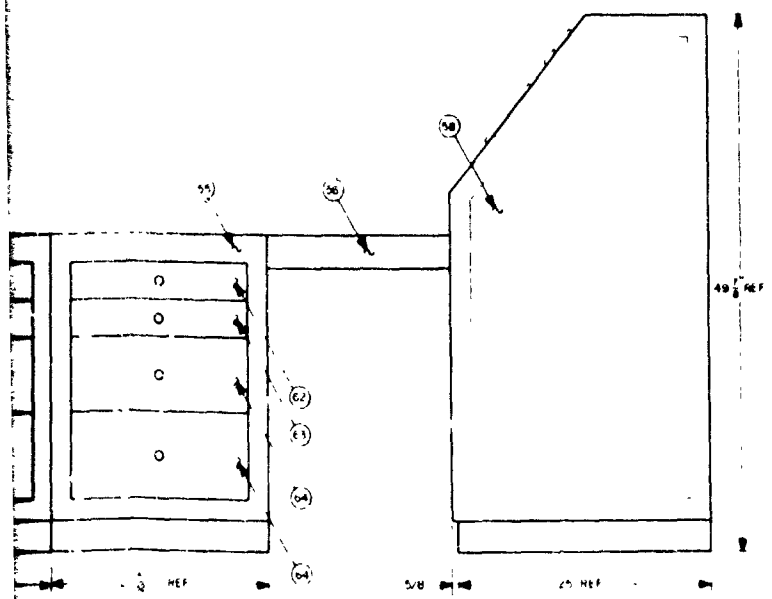
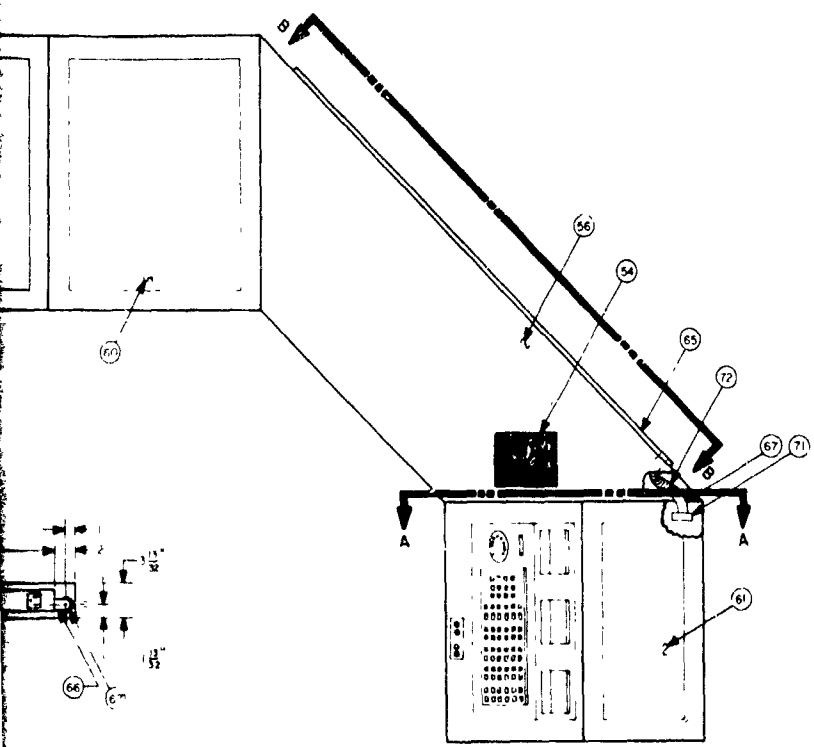


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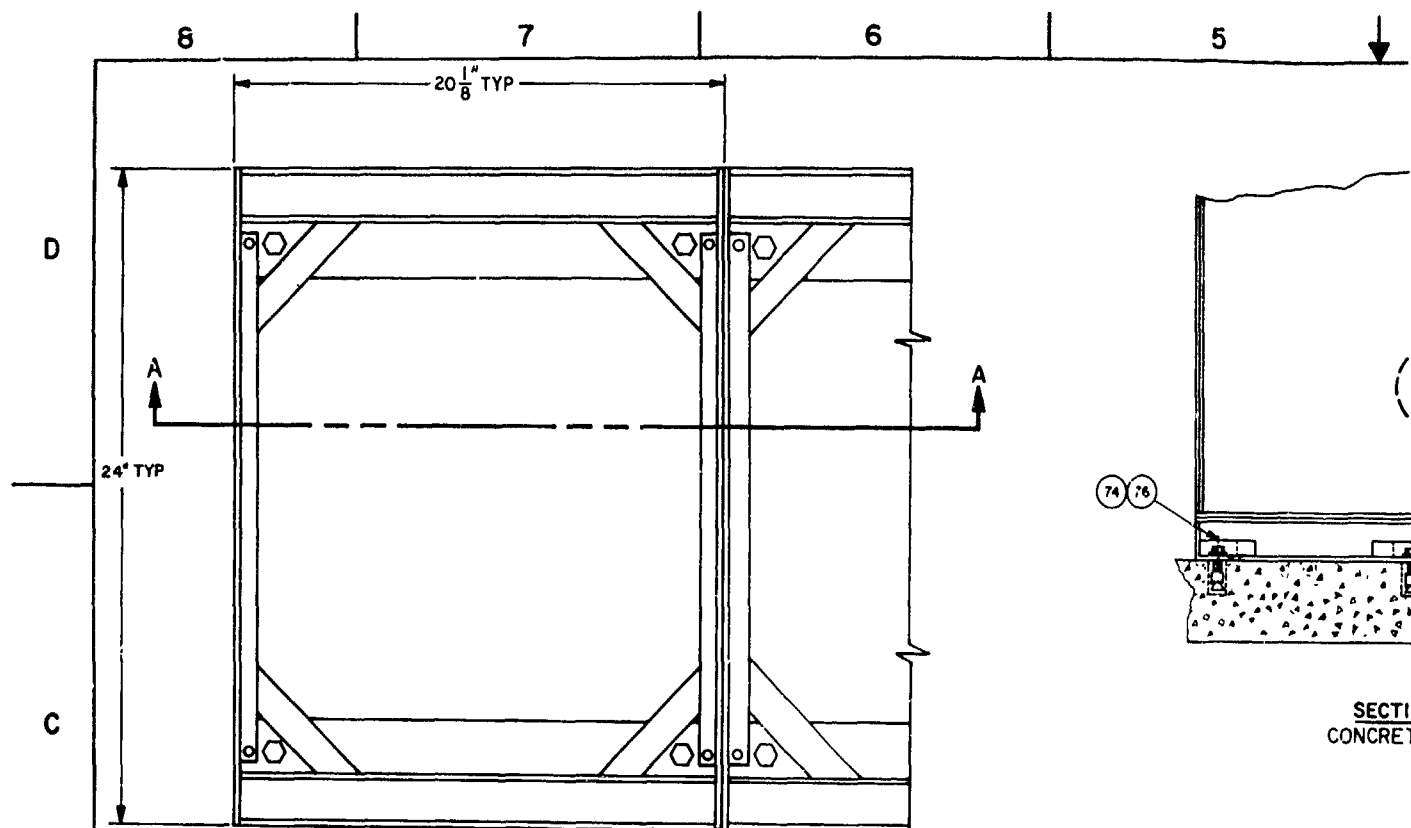


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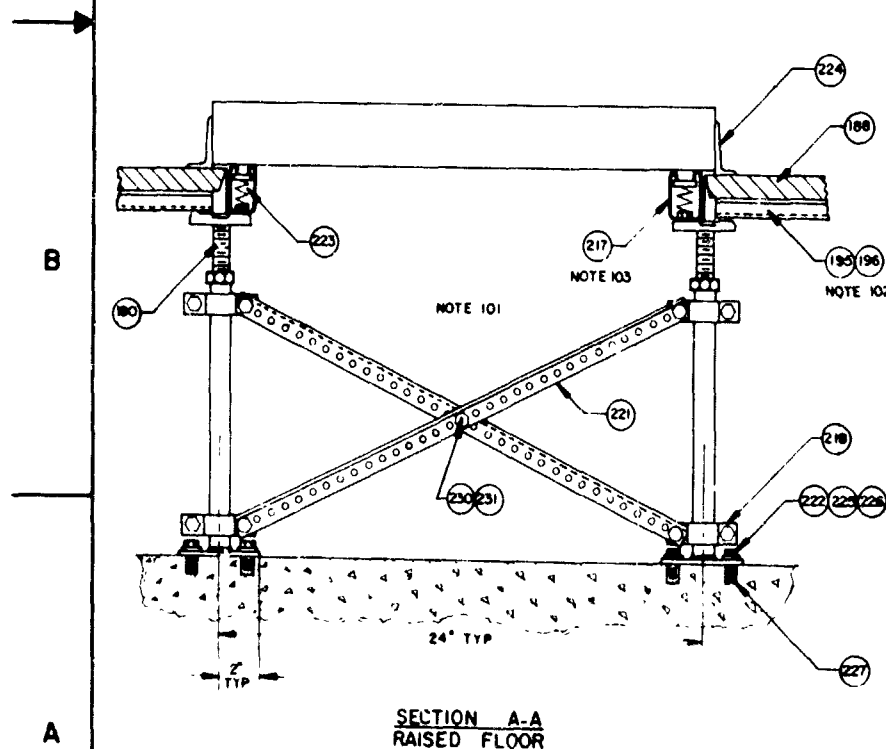


ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
ORGANIZATION				
USACEEIA-CED				
FORT HUACHUCA, ARIZONA				
TYPICAL ROW ELEVATION				
DESIGN BY J. RAMEY				
DRAFTSMAN N. E. PARRENS				
CHECKER J. E. JONES				
DATE NOV 5 1975				
ORGANIZATION APPROVAL				
CODE SHEET NO. 5125				

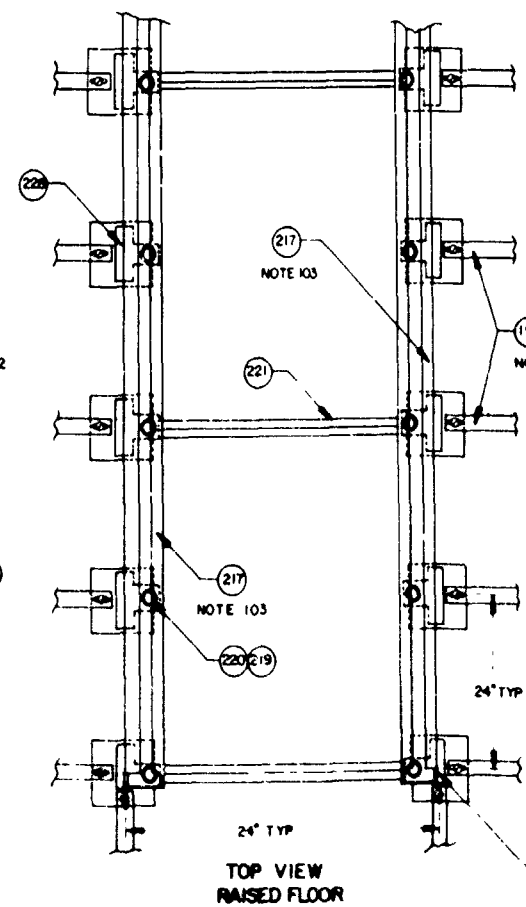


SECTION  
CONCRETE

RACK INCLOSURE

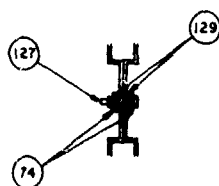


SECTION A-A  
RAISED FLOOR

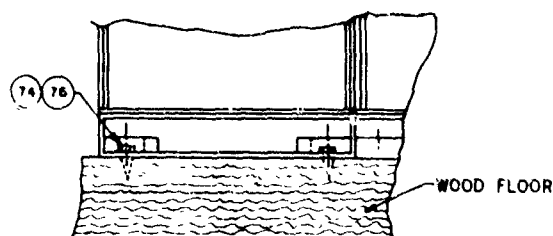


TOP VIEW  
RAISED FLOOR

SECTION A-A  
CONCRETE FLOOR



DETAIL A



SECTION A-A  
WOOD FLOOR

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	REVISED AND ADDED SHEETS 2 & 3	7 MAR 79	<i>[Signature]</i>

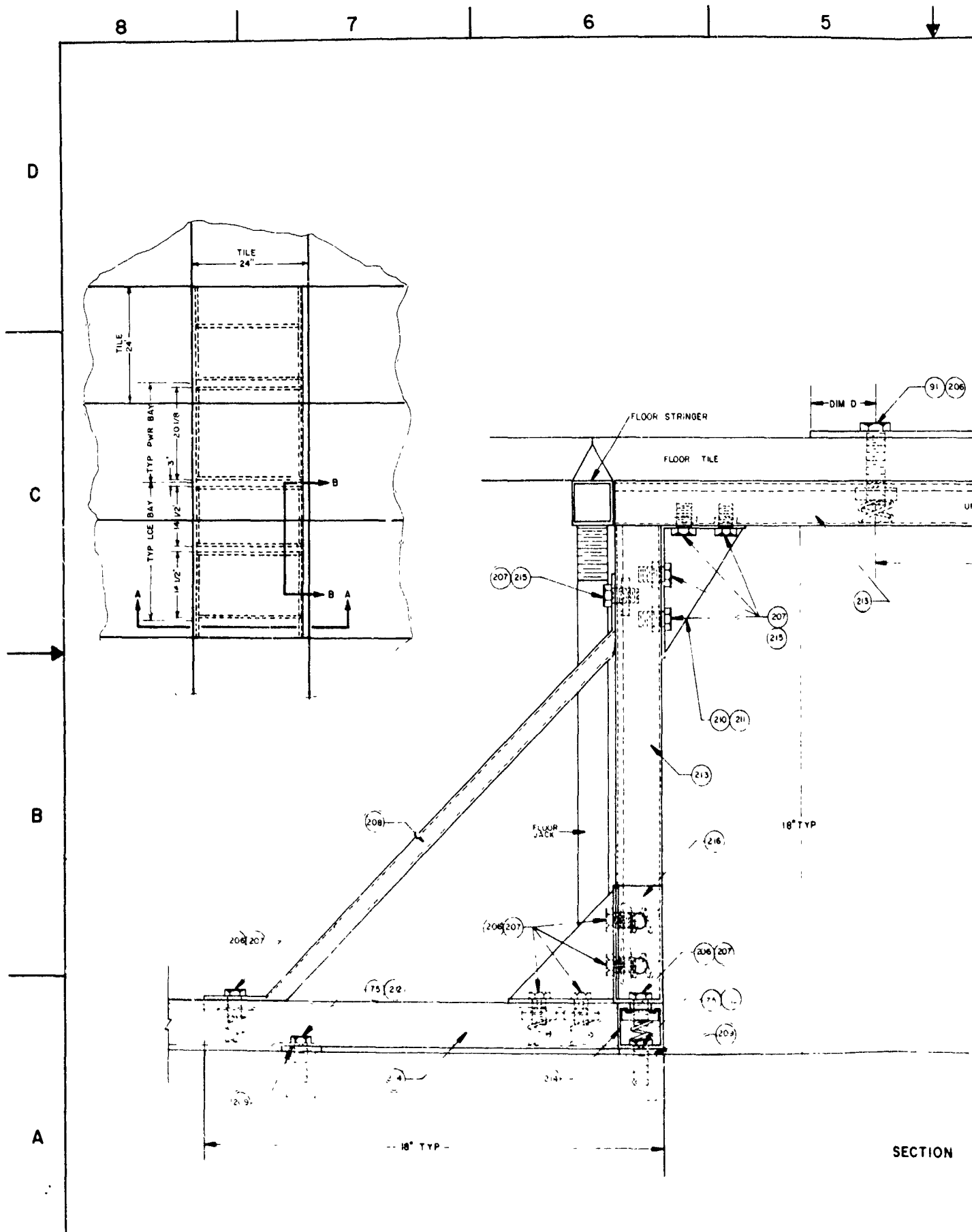
**NOTES:**

- 101 CROSS BRACING MAY BE REQUIRED DURING INSTALLATION  
102 STRINGERS FOR FLOOR PANELS WILL BE SELECTED TO MEET  
103 INSTALLATION REQUIREMENTS FOR SPECIFIC CONFIGURATION  
104  
105 STANDARD LENGTH IS 20', WHEN A 10' SECTION IS REQUIRED  
106 A SECTION MUST BE CUT

231	12239G	NUT, PLAIN HEX, 1/4-20	5305 00-088-0502	HD	
230	24261N	SCREW, HH, 1/4-20 X 1/2, MS 35307-303	5305-00-719-3997	EA	
229	24262M	FITTING, FLAT PLATE, 1/8" X 1 7/8" X 7/8", (UNISTRUT P0008)		FA	
228	24263L	FITTING, FLAT PLATE, 1/8" X 1 7/8" X 1 1/8", (UNISTRUT P0008)		EA	
227	00737A	EXPANSION SHIELD, 1/4"X 16 X 1 3/32, 97052A009		EA	
226	06278B	WASHER, LOCK, 1/4 MS35338-44	5310 00-582-5965	EA	
225	24264K	WASHER, FLAT, 1/4 MS27183-9		EA	
224	24265J	BASEBOARD, VINYL, 2 1/2" X 4", 37XMIIN 944		EA	
223	24266Z	NUT, W/SPRING 3/8-16, UNISTRUT P5508		EA	
222	24267A	SCREW, HH, 1/4-20 X 1-1/2, MS30725-12	5305 00-071-2239	EA	
221	24268B	CROSS ANGLE, 1" X 1" X 70 PMA 78A		EA	
220	00586C	WASHER, LOCK 3/8	5310 00-637-5841	EA	
219	09100C	SCREW, HH, 3/8-16 X 1-1/2"	5305 00 269-3214	HD	
218	24277Z	PIPE CLAMP, 1" SUPE ISTRUT C 2104		EA	
217	16111M	CHANNEL UNISTRUT 1 5/8" X 7/8" X 20"		EA	
216	24272N	FITTING, WING SHAPE UNISTRUT P2226	5340 00-800-8080	EA	
215	15503F	NUT, SQUARE 3/8-16	5310 00 994947	GR	
214	21850D	CHANNEL, UNISTRUT 1 5/8" X 1 5/8" X 105, P0007		FT	
213	00793E	CHANNEL, UNISTRUT 1 5/8" X 1 5/8" X 105, P1000	5820 00-693-2400	FT	
212	00454C	BOLT, HH, 3/8 16 X 1/2	5306 00 298-2368	EA	
211	24273M	FITTING, FLAT PLATE, UNISTRUT A1332		EA	
210	24274L	FITTING FLAT PLATE UNISTRUT A 331		EA	
209	24275K	FITTING FLAT PLATE, UNISTRUT A1082		EA	
208	24276J	TUBULAR KNEE BRACE, UNISTRUT P2408 H		EA	
207	24261N	BOLT, HH, 3/8 16 X 3/4 H37HNC5375G		EA	
206	10578F	NUT, SPRING 3/8-16 UNISTRUT P1008	5310 00-588-0326	EA	
205	09851N	BOLT HH, 3/8 16 X 2 1/2	5306 J0 299-2371	PC	
204	21677E	STRINGER MARK 20, 2		EA	
203	23676J	STRINGER MARK 20, 6		EA	
202	1567 J	MEDESTAL MARK 20		EA	
201	1566M	FLEXON PANEL MARK 20		EA	
200	23222E	EXTERNAL TOOTH LOCK WASHER 91114A031		EA	
199	15 0B	HHMS W NUT 5/8 16 X 3/4" 90252AE22		EA	
198	15490T	NUT 3/8 16 X 2 9/16 P 403465		EA	
197	15478B	LAG SCREW 1/8 X 1 1/4 9147A625		EA	
196	15 79E	EXPANSION SHIELD 3/8 16 X 7/16 97052A009	5340 00 664-1345	EA	
195	15474E	FLAT WASHER 3/8 9214A031		EA	
194	15474E	DESCRIPTION	PART NO / MSN	UI	QTY

## PARTS LIST

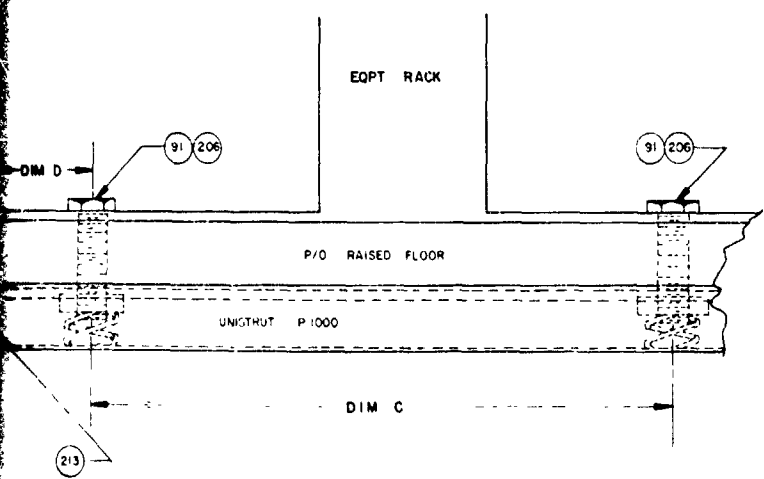
		USACEEIA-CED	
		FORT MONROE, ARIZONA	
DESIGN BY	J RAMEY	TYPICAL BAY INSTALLATION	
DRAWN BY	G OLSON		
CHECKER	<i>H. [Signature]</i>		
DATE	13 APR 76		
ORGANIZATION APPROVED		CODE GROUP NO.	SIZE
<i>[Signature]</i>		50470	D
		COM-TC03-105	



SECTION

5 4 3 2 1

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	ADDED THIS SHEET	7 MAR 79	<i>[Signature]</i>



NOTE :  
201 ONLY ONE SIDE OF EQUIPMENT SUPPORT IS SHOWN OTHER  
SIDE IS MIRROR IMAGE.

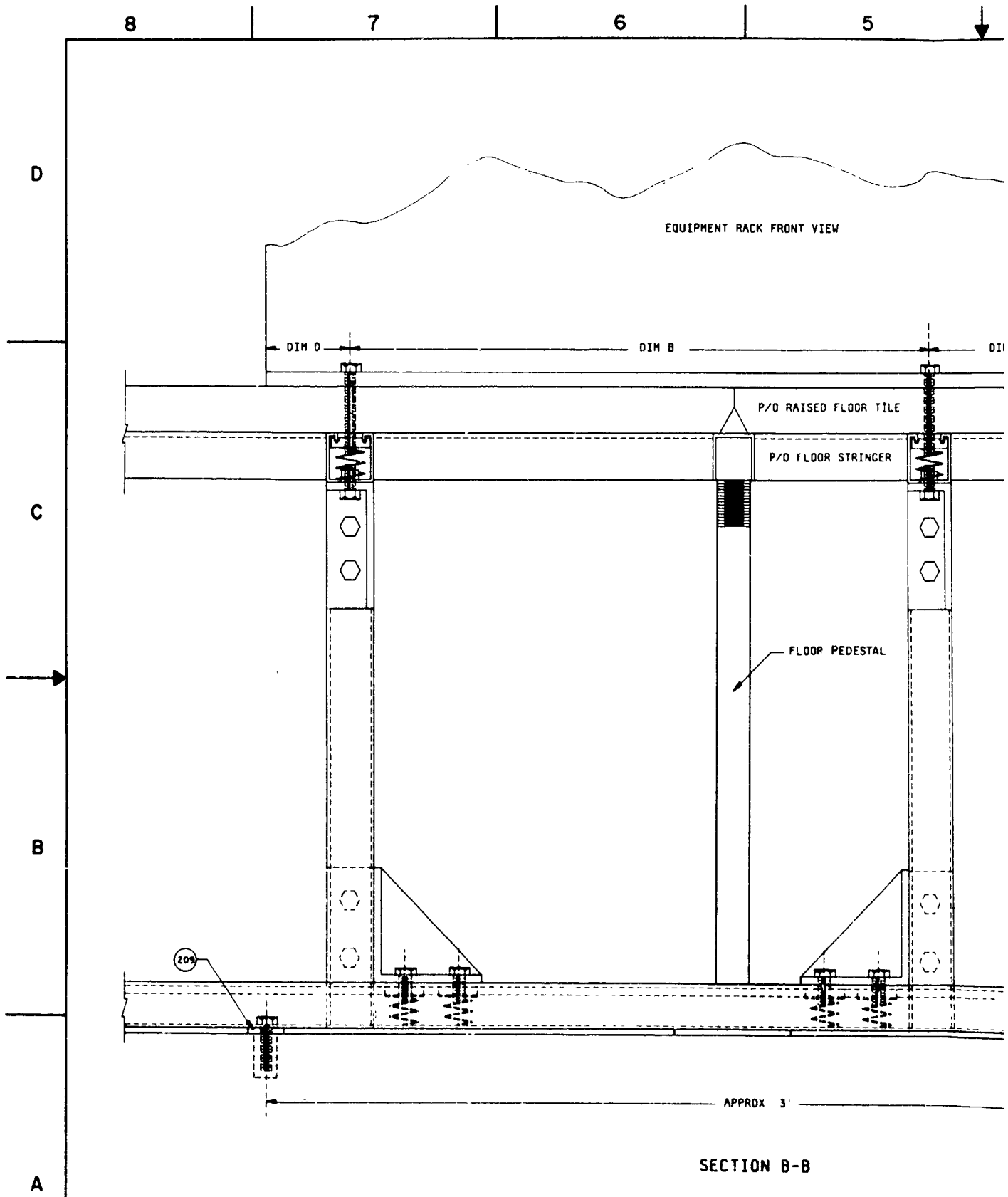
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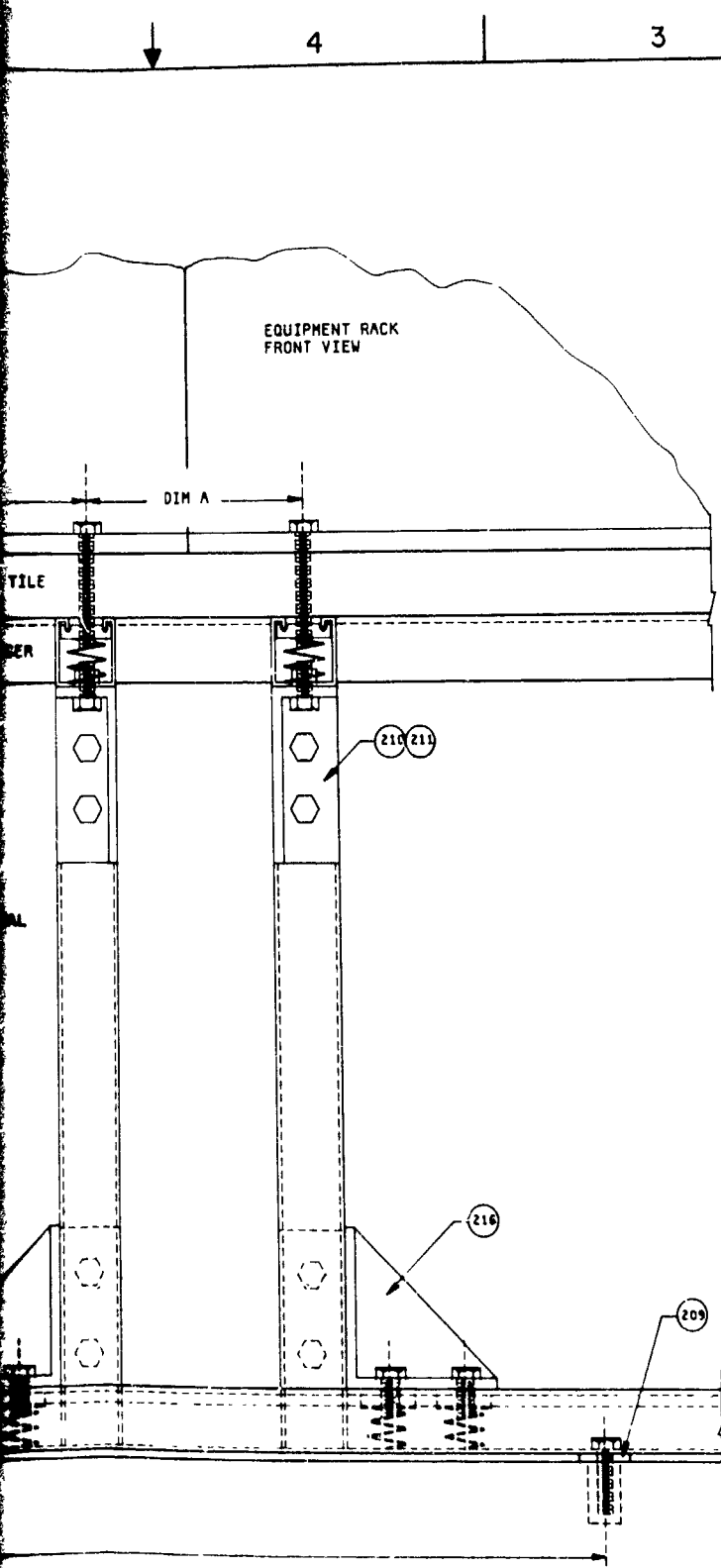
C

B

A

SECTION A-A





REVISION			
ZONE	REV	DESCRIPTION	DATE
	A	ADDED THIS SHEET	7 MAR 79

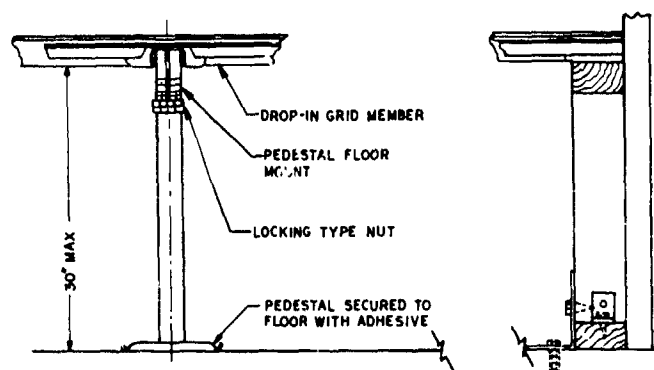
TYPICAL DIMINSIONS:

	LCE	DC PWR SYS
DIM A =	6"	5"
DIM B =	14 5"	20 125"
DIM C =	9"	12.5"
DIM D =	3"	2.5"

D  
C  
B  
A

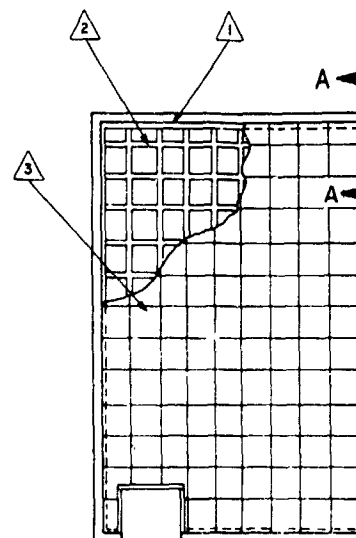


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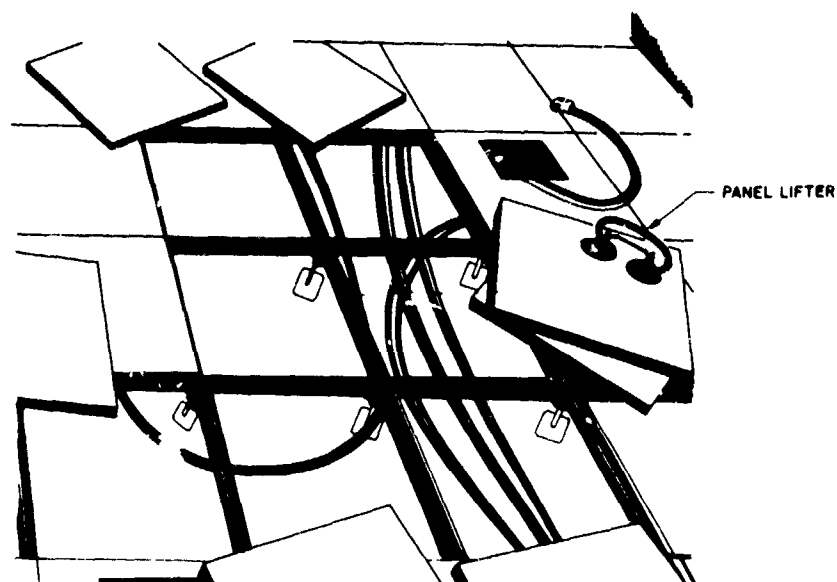
SECTION A-A

TYPICAL VIEW SHOWING METHOD FOR WALL  
SUPPORT CONSTRUCTION AND JACK PEDESTAL  
INSTALLATION

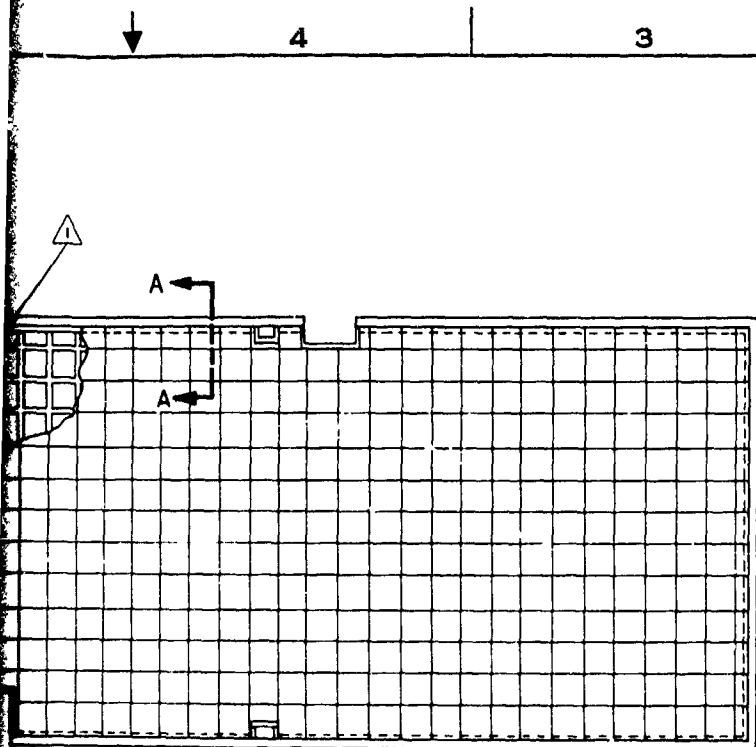


TYPICAL FLOC

CUT - A - WA  
OF A GF



PERSPECTIVE VIEW



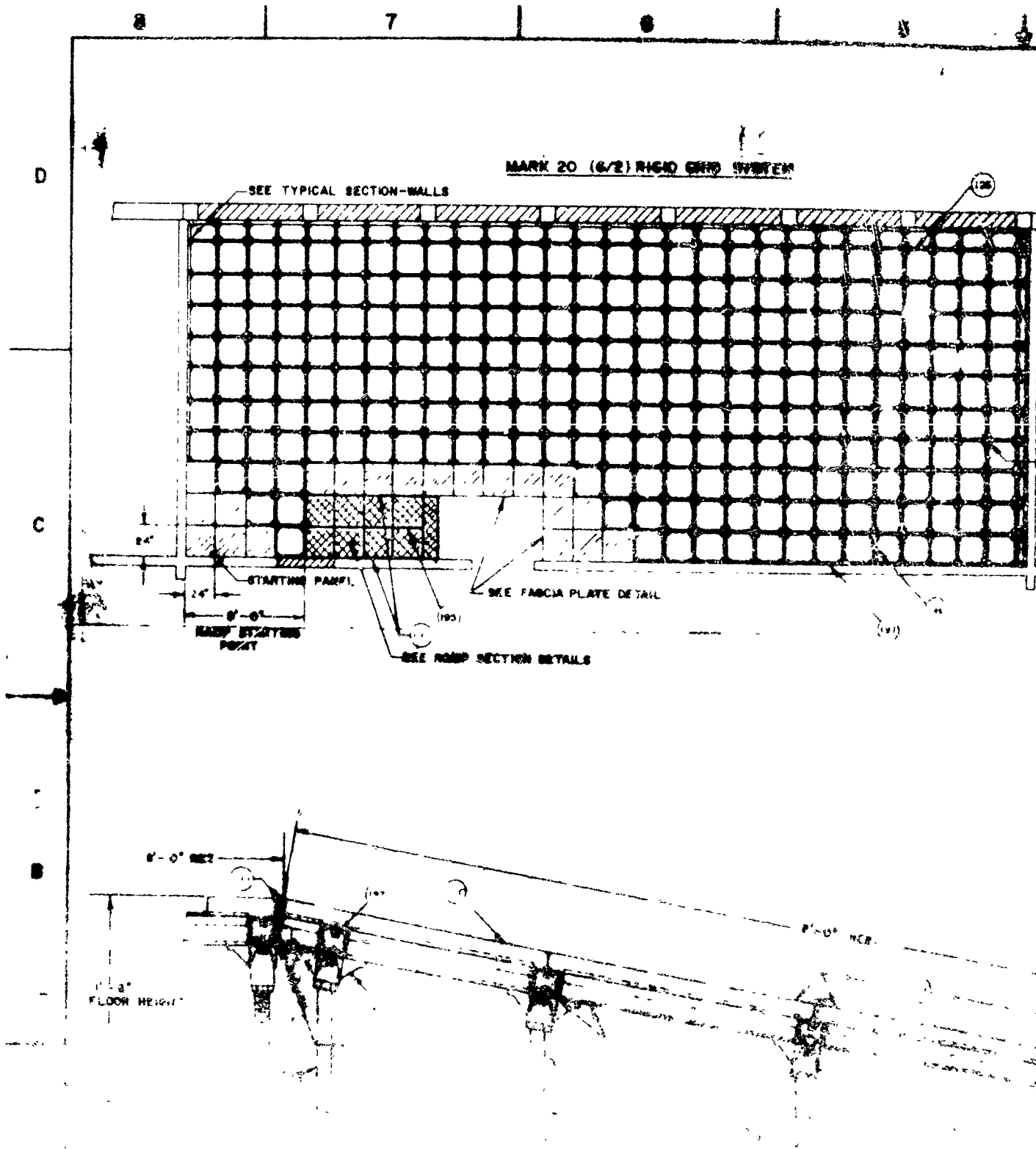
TYPICAL FLOOR PLAN OF 24" SQ STEEL TILE

CUT-A-WAY VIEW IS SHOWN FOR CLARITY  
OF A GRID-TYPE STRINGER SYSTEM

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

- 1 SUPPORT FRAMING INSTALLATION COM-TC03-107
- 2 STRINGER SUPPORT INSTALLATION COM-TC03-108
- 3 FLOOR TILE INSTALLATION COM-TC03-109

ITEM	DESCRIPTION	PN	UI	QTY
LIST OF MATERIALS				
USACEEIA-CED FORT HANCOCK, ARIZONA				
DESIGN BY	J RAMEY	RAISED FLOOR INSTALLATION		
DRAFTSMAN	J KALLBERG			
CHECKER	<i>[Signature]</i>			
DATE	13 APR 76			



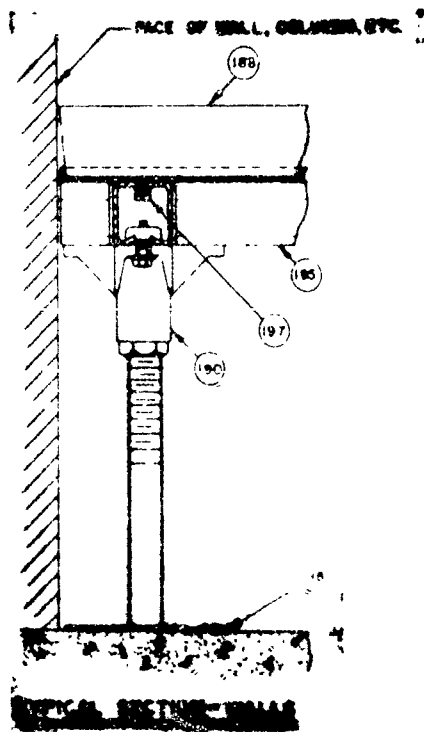


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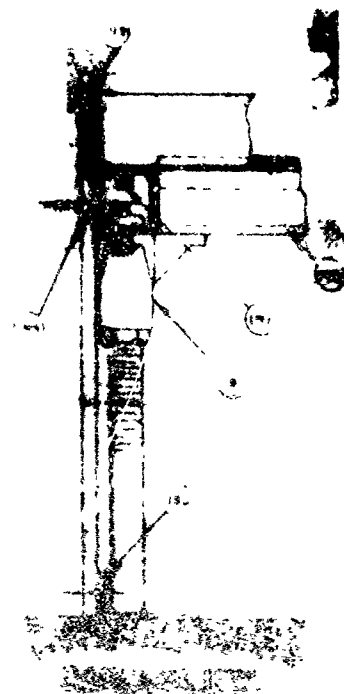
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D



C

B

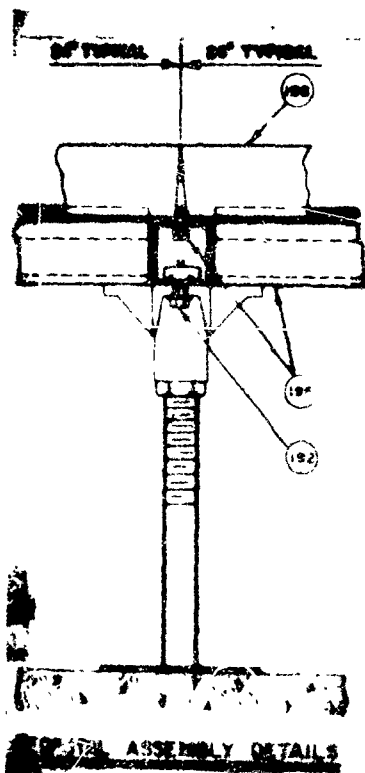


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REVISION			
NO.	REASON	DATE	APPROVED
1	REVISED AND CHANGED SHEET NO	2 MAR 79	JCA



D

C

B



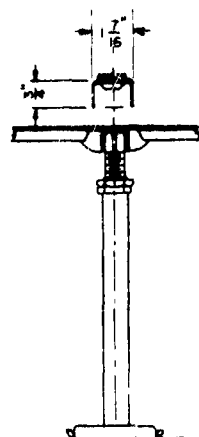
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2

1

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
A		CHANGED LIST OF MATERIALS	1 NOV 76



DROP-IN GRID MEMBER

MATERIAL STEEL, GALVANIZED FINISH, .040" GAUGE  
AND 109

PEDESTAL

ALL STEEL, WELDED CONSTRUCTION, ZINC PLATED  
RATED 5,000 LBS MINDETAIL VIEW OF PEDESTAL AND STRINGERPEDESTAL ASSY INCLUDES ALL  
COMPONENTS AND HARDWARE

86	23495Z	PEDESTAL ASSY MARK-12			16
85	23484J	DROP-IN GRID SUPPORT MARK-12			16
ROP ITEM	ADL	DESCRIPTION / PART NO	NSN	UT	16

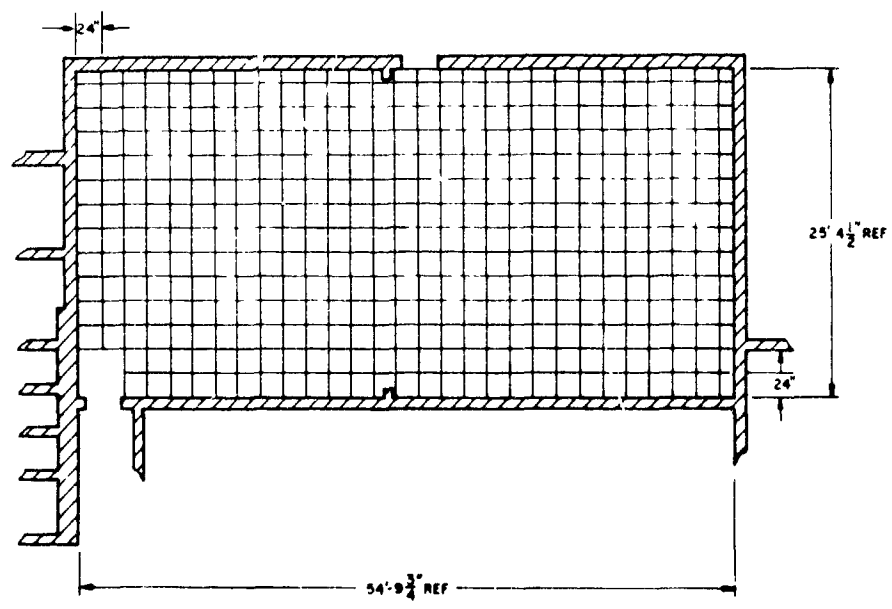
## LIST OF MATERIALS

		USACEEIA-CED FORT MONMOUTH, NEW JERSEY			
DESIGN BY	J RAMEY	STRINGER SUPPORT INSTALLATION			
DRAFTSMAN	J KALLBERG				
CHECKER					
DATE	14 APR 76				
ORD UTILIZATION APPROVAL		DATE SENT TO	LOT	COM-TC03-108	
M A X		50470	D		



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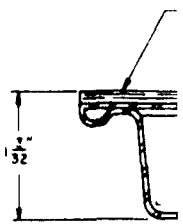
D  
C  
B  
A



PLAN VIEW SHOWING TILE LAYOUT

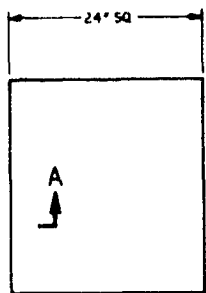
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TO

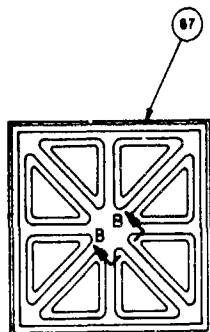


SECT

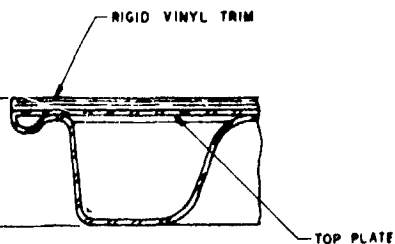
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		CHANGED L O M	7 NOV 78	<i>jak</i>



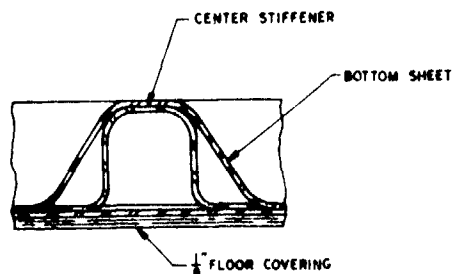
TOP VIEW



BOTTOM VIEW



SECTION A-A



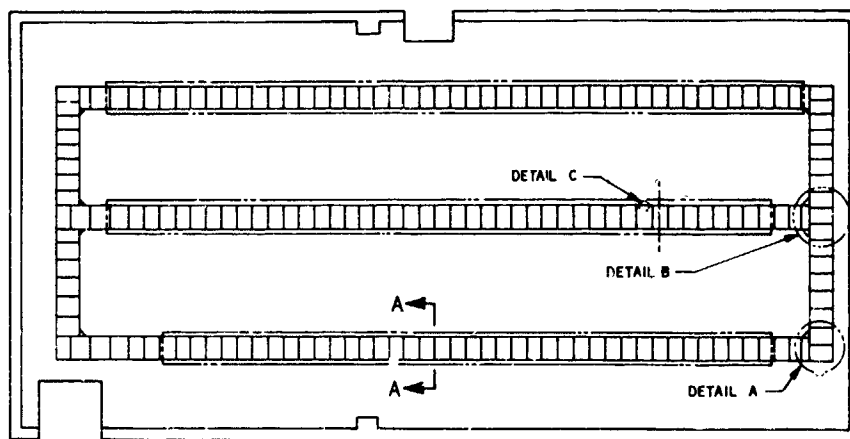
SECTION B-B

TILE CONSTRUCTION DETAILS

B7	23406A	TILE, 24" SQ MARK 12			17
NO ITEM	AML	DESCRIPTION / PART NO.	QTY	UNIT	NOTE
LIST OF MATERIALS					
		USACEEIA-CED			
		FORT MONROE, VIRGINIA			
DESIGN BY	J. RAMEY	FLOOR TILE INSTALLATION			
DRAFTSMAN	G. OLSON				
CHECKER	<i>[Signature]</i>				
DATE	14 APR 78				

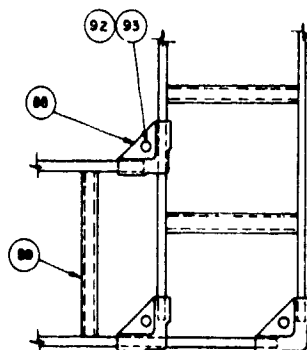
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D

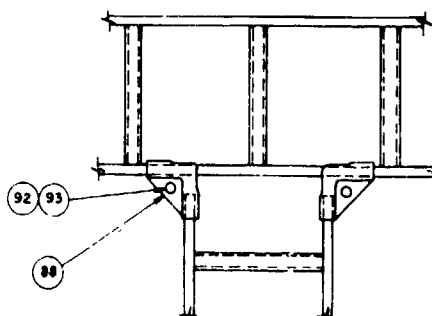


CABLE RACK LAYOUT

C

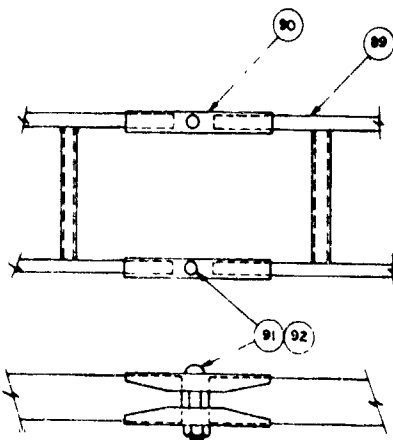


DETAIL A



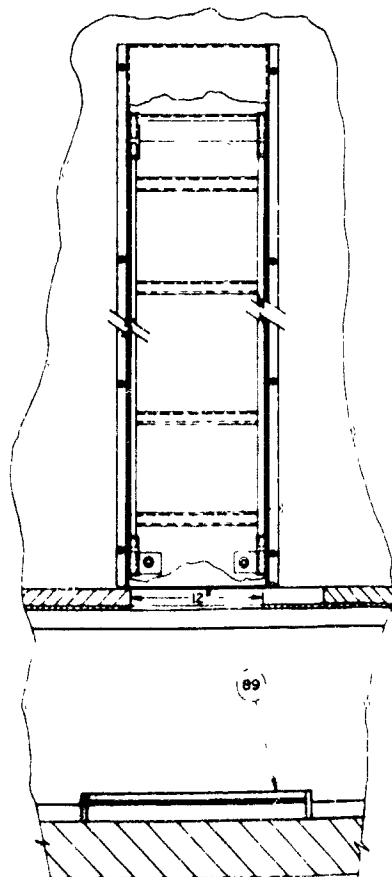
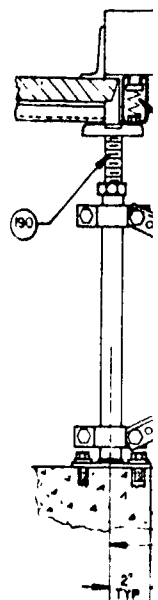
DETAIL B

B

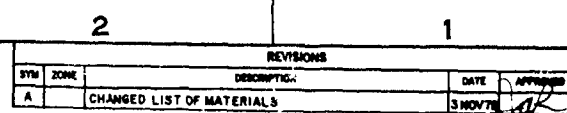


DETAIL C

A



TYPICAL VIEW OF INTERFACING FLOOR INSTALL ROOM TO UND



INTERFACING, EXISTING CABLE TRAY TO NEW UNDER-  
FLOOR INSTALLATION OR OVERHEAD FROM ADJOINING  
ROOM TO UNDERFLOOR OR VICE-VERSA

231	12239G	NUT, PLAIN HEX, 1/4-20	3305-00-086-0802	HD	
230	24261N	SCREW, HH, 1/4-20 X 1/2, MS 30307-303	3305-00-719-3997	EA	
227	00717A	EXPANSION SHIELD, 1/4X7/16 X 1/32, 97002A209		EA	
226	06228B	WASHER, LOCK, 1/4 MS30338-44	3310-00-582-5965	EA	
225	24264K	WASHER, FLAT, 1/4 MS27183-9		EA	
224	24265J	BASEBOARD, VINYL 2 1/2" X 4", 37KMIH 844		EA	
223	24265E	NUT, W/SPRING 3/8 IS, UNISTRUT P5508		EA	
222	24267A	SCREW, HH, 1/4-20 X 1/2, MS80725-12	3305-00-071-2239	EA	
221	24268B	CROSS ANGLE, 1" X 1" X 7/8", PMA 78A		EA	
218	24277Z	PIPE CLAMP, 1" SUPERSTRUT C 2101		EA	
217	16111M	CHANNEL UNISTRUT 1 5/8" X 2 7/8" X 20"		EA	
196	23677L	STRINGER MARK 20, 2"		EA	
195	23678D	STRINGER MARK 20, 6"		EA	
190	23671J	PEDESTAL, MARK 20		EA	
188	23669H	FLOOR PANEL, MARK 20		EA	
97	23486Z	FOOT, 5", P-401751		15	
96	23486J	BOLT, 3/8"-16 X 2 15/16", P-403486		15	
95	09361A	EDGE CLAMP, P-403477		15	
94	23493L	EDGE CLAMP, P-403475		15	
93	09358J	BOLT, 3/8"-16 X 1 11/16", P-403470		15	
92	09257I	NUT, HEX, 3/8"-16, P-401482		15	
91	23490Y	BOLT, 3/8"-16 X 2 3/16", P-403467		15	
90	23489D	CLAMP, STRAIGHT, P-403472		13	
89	23488C	CABLE RACK, 2" X 20" X 6"-6 1/2", P-401705		15	
88	23487B	CLAMP, CORNER, P-403473	3340-00-317-8884	15	
87	23486A	TILE, 24 X 24, MARK 12		15	
86	23485Z	PEDESTAL ASSEMBLY, MARK 12		15	
85	23484J	DROP-IN GRID SUPPORT, MARK 12		15	
79	23479E	HEX HD BOLT, 3/8"-16 X 1 1/4"		15	
75	00718E	EXPANSION ANCHOR, 3/8"-16 X 1 3/8", 870B1A031	3340-00-084-1343	13	
BOM ITEM	AEL	DESCRIPTION/PART NO	NSN	UI	BOM QTY

USACEEIA-CED  
FORT WASHINGTON, ARIZONA

UNDERFLOOR CABLE RACK INSTALLATION

ORGANIZATION NUMBER

PORT MARCHAND, ALASKA

## UNDERFLOOR CABLE RACK INSTALLATION

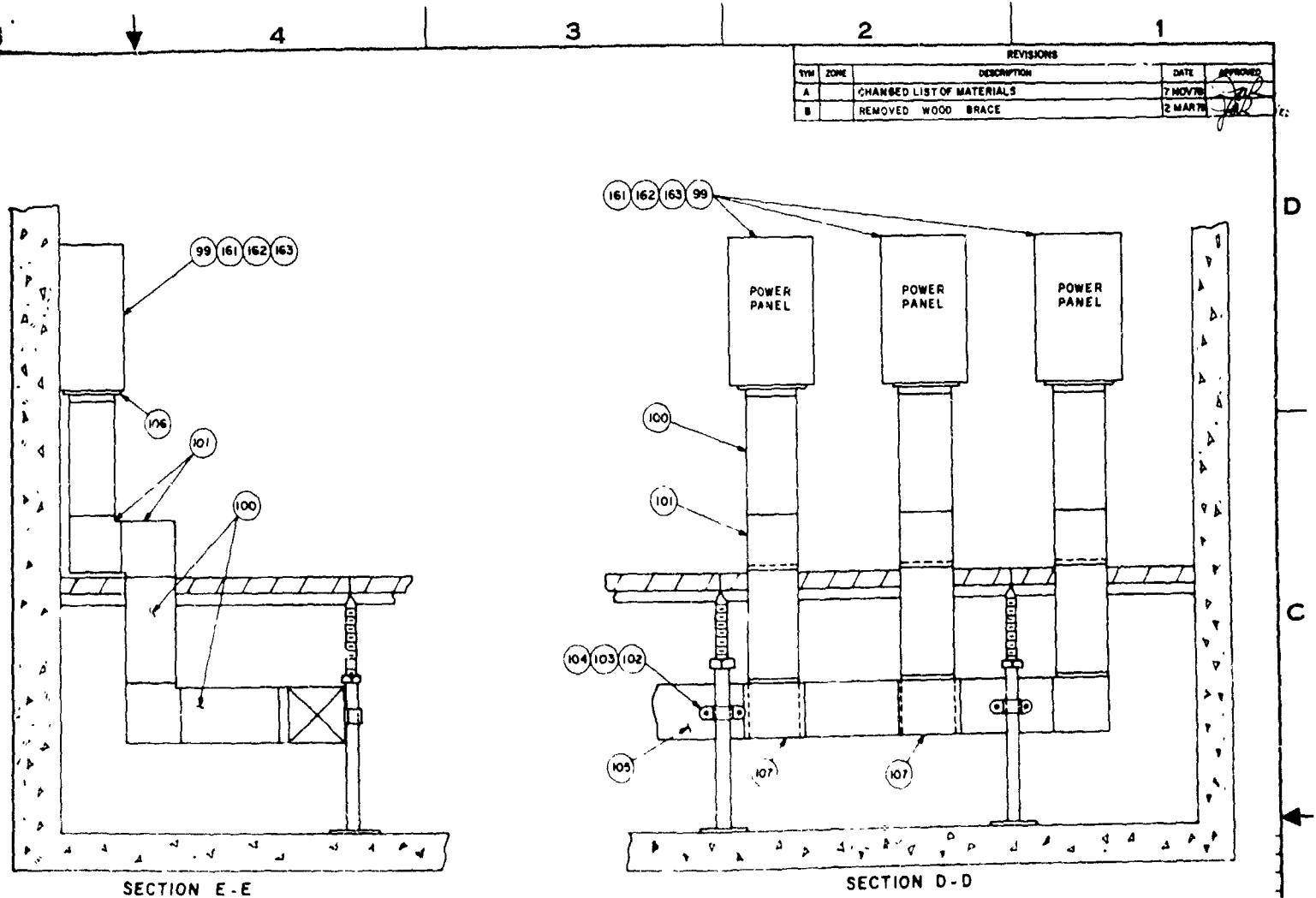
COM-TC03-110

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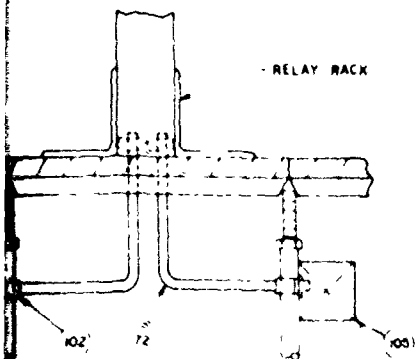


# A

TYPICAL SECTION SH  
ROUTING FLEXIBLE



TYPICAL SECTIONS SHOWING WALL MOUNTED POWER PANELS FOR AN UNDERFLOOR POWER DUCT SYSTEM



SECTION C-C

SECTION C-C SHOWING METHOD OF FITTING FLEXIBLE CONDUIT RUNS

ITEM	ZONE	DESCRIPTION	DATE	APPROVED
A		CHANGED LIST OF MATERIALS	7 NOV 78	
B		REMOVED WOOD BRACE	2 MAR 79	

168	084372	CLOSING PLATE, LD 4 CP	9875-00-004-1489	16
163	20280H	CIRCUIT BREAKER, 00115	9825-00-040-4811	16
162	23303D	POWER PANEL, GROUND BAR KIT P4230TA	9825-00-00-004	16
161	23334C	POWER PANEL, COVER, 00C30S	9875-00-187-088	16
107	08403A	TEE, 4", LD 4T	9875-00-070-075	16
106	09388Y	ADAPTER, 4" LD 4AA	9875-00-070-076	16
105	20172K	POWER DUCT, 4" X 4" X 10', LD 40 WK		16
104	23507B	HEX NUT, B-32, B3438A009		13
103	23507F	MACHINE SCREW, PH B-32 X 1/2, B0283A004		13
102	2350	SHAP STRAP, 3/4", 4180		12
101	23500D	90 DEGREE ELBOW, LD 490L		10
100	23499C	POWER DUCT, 4" X 4" X 1', LD 41 WK		16
99	23498B	POWER PANEL, 00430-40		16
72	02581Y	3/4" TRADE SIZE FLEX CONDUIT STEEL	9875-00-1P-1223	12
67	002500	STRAIGHT BOX CORR 3/4", B333		12
BOM ITEM	AEL	DESCRIPTION/PART NO	NS 4	UI

LIST OF MATERIALS

USACEEIA-CFD

PORT HANCOCK, ME 04074

DESIGN BY J. RAMEY  
 DRAFTSMAN J. KAL. BERG  
 CHECKER  
 DATE 15 APR 79  
 ORGANIZATION APPROVAL

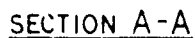
AC AND DC POWER DUCT INSTALLATION  
 (ELEVATED FLOOR)

CODE SHEET NO.

REV

FORM 7003-111

DETAILED



A detailed diagram of a rectangular building layout, likely a school or institutional building, showing internal circulation paths. The building is divided into several horizontal sections by vertical walls. The paths are labeled as follows:

- Path A:** Indicated by upward-pointing arrows in the lower central part of the building.
- Path B:** Indicated by arrows pointing left at the top and bottom of the building.
- Path C:** Indicated by arrows pointing left at the top and bottom of the building, near the left wall.
- Path D:** Indicated by upward-pointing arrows in the lower right part of the building.
- Path E:** Indicated by upward-pointing arrows in the middle of the building.

The diagram shows a complex network of paths connecting different parts of the building, with arrows indicating the direction of travel.

VIEW OF OVHD AC-DC POWER DUCT & CABLE TRAY ROUTING



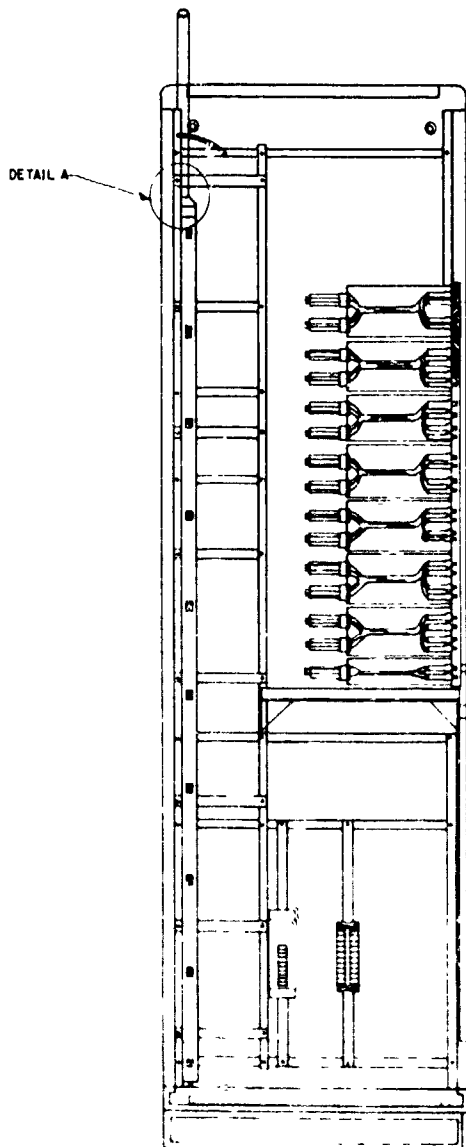
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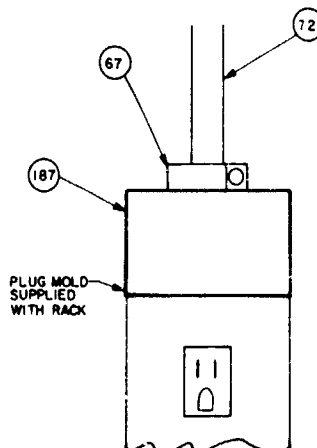
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REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		ADDED EQUIPMENT RACK, DETAIL A, CHANGED LIST OF MATERIALS	9 NOV 76	



DETAIL A

EQUIPMENT RACK  
RIGHT SIDE VIEWPLUG MOLD  
SUPPLIED  
WITH RACKDETAIL A  
TYPICAL TOP  
OR BOTTOM OF  
PLUGMOLD

187	1440TH	FITTING, END, 2010A	5975-00-873-700A	10
186	235386	BEAM CLAMP, SERIES 500, NUMBER 503		13
185	235577	THREADED ROD, STEEL, 1/2"-13UNC X 5'		13
184	23558E	ADJUSTABLE BEAM CLAMP, E-180-1/2		12
183	20280H	CIRCUIT BREAKER 00115	5925-00-818-4811	16
182	235950	POWER PANEL, GROUND BAR KIT, PK2387A	5925-00-801-8043	16
181	23554C	POWER PANEL COVER, QOC308	5975-00-807-0884	18
151	23524F	1 1/2" X 1/4" CLIP FOR 3/8" ROD, P-400298		15
150	23523E	3/8" STAR LOKIN EXPANSION SHIELD, P-409044		13
126	218582	GROUND BOX ASSEMBLY		
125	235198	CLIP (FOR 3/8" ROD AND CHANNEL) P-453278		18
124	07674Y	THREADED ROD, 3/8"-16, STEEL	5306-00-819-8496	13
123	00405W	THREADED ROD, 3/8"-11, STEEL	5306-00-407-8401	13
122	235172	CLIP (FOR 3/8" ROD AND CHANNEL) P-258449		18
21	23518W	CHANNEL (TRAY SUPPORT) 2" X 3/16" X 3/16" X 1/8", ALUMINUM		13
20	23515H	LOCK WASHER, 5/8", 10934980035		13
119	23514G	FLAT WASHER 3/8" ID 934900035		13
118	23513F	HEX NUT 5/8"-11, P-208261		15
117	23512E	HINGED CONNECTOR LD4C		16
116	09403K	TEEL, LD4T	5975-00-870-8875	16
115	09388H	ADAPTER SQUARE D LD44A	5975-00-870-8873	16
114	20174A	POWER DUCT 4" X 4", LD440WR		16
113	215000	ELBOW, 90 DEGREES LD490L		14
99	23498B	POWER PANEL QO430-40		16
89	23488C	CABLE RACK 2" X 20" J-40705		15
8	114786	AG SCREW 3/8" D X 1/4" 3647A826 STEEL		15
4	LD417	CONDUIT FLEXIBLE 3/4" D, STEEL	5975-00-178-1223	12
2	042500	STRAIGHT BOX CONNECTOR 5335		12
SYM	ZONE	DESCRIPTION/PART NO	NSN	UI

## LIST OF MATERIALS

ORGANIZATION

USACEEIA-CED

FORT MONMOUTH, NEW JERSEY

DESIGN BY J. RAMLEY

DRAFTSMAN J. WREN

CHECKER J. WREN

DATE 15 APR 76

CEILING SUPPORTED CABLE RACK  
AND POWER DUCT INSTALLATION



8

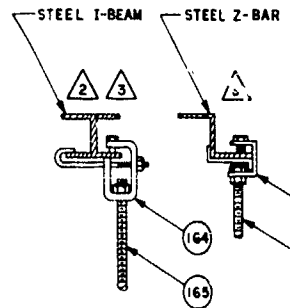
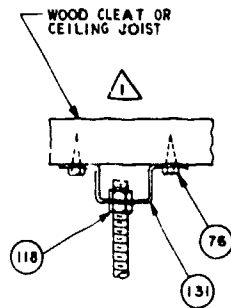
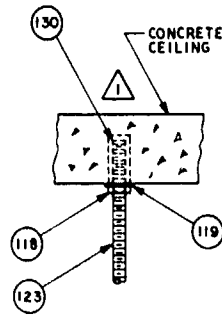
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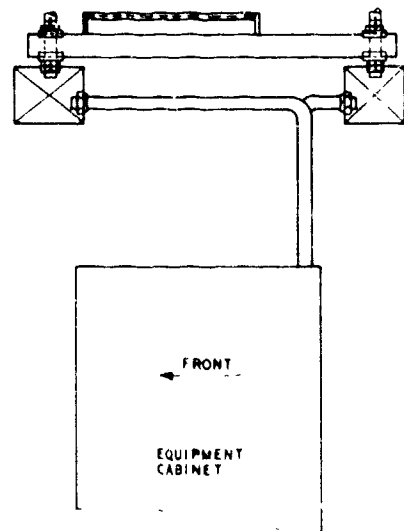
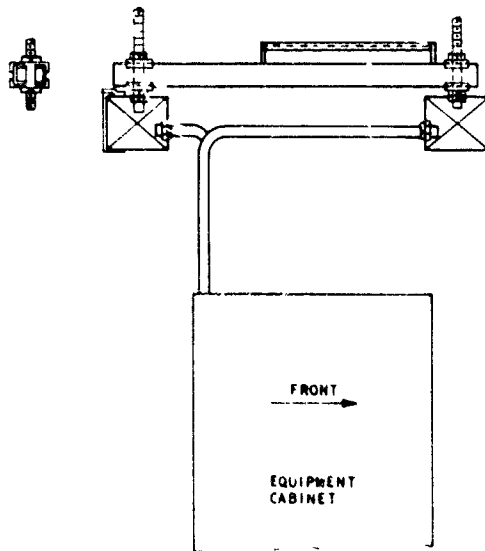
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D



TYPICAL CEILING ANCHOR DETAILS

C



B

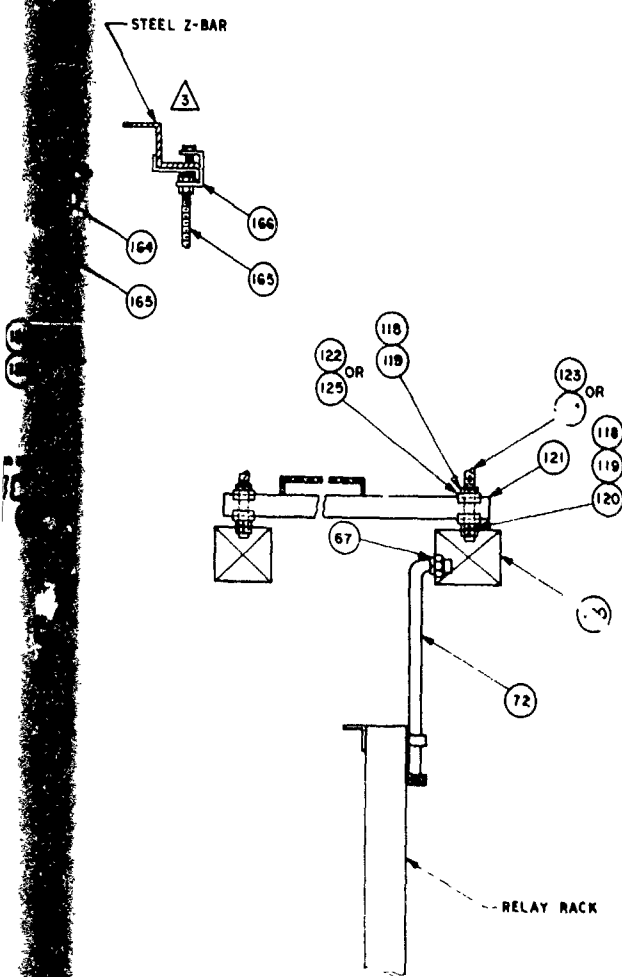
SECTION B-B

TYPICAL SECTIONAL VIEW SHOWING METHOD FOR  
INSTALLATION OF OVERHEAD CABLE LADDER

A

4 3 2 1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS/ADDED ITEM #67	9 NOV 76	



- 1 SEE TELECOMMUNICATIONS ENGINEERING-INSTALLATION PRACTICES  
CCTM-105-50-21 (FIG 3-21)
- 2 DUE TO VARIOUS FLANGE WIDTHS IN I-BEAMS THE PROPER SIZE  
CLAMP WILL BE SELECTED AS FOLLOWS
- | GRAYBAR PART NO. | FLANGE WIDTH  |
|------------------|---------------|
| E-160-1/2-6      | 2 1/2" TO 6"  |
| E-160-1/2-9      | 5 1/2" TO 9"  |
| E-160-1/2-12     | 8 1/2" TO 12" |
- 3 CLAMPS FOR I BEAMS AND Z-BARS ARE THREADED TO ACCOMMODATE  
1/2"-13 UNC THREADED ROD

BOM M	DESCRIPTION/PART NO	NSN/SPEC	UI	BOM NOTE
LIST OF MATERIALS				
DESIGN BY J RAMEY		ORGANIZATION USACEEIA-CED FORT HARRIS, ARIZONA		
CHECKER J WREN		CEILING SUPPORTED CABLE RACK AND POWER DUCT INSTALLATION		
DATE 6 APR 76				
ORGANIZATION APPROVAL		CODE	REVISION NO	DATE
		60470	D	COM-TC03-112

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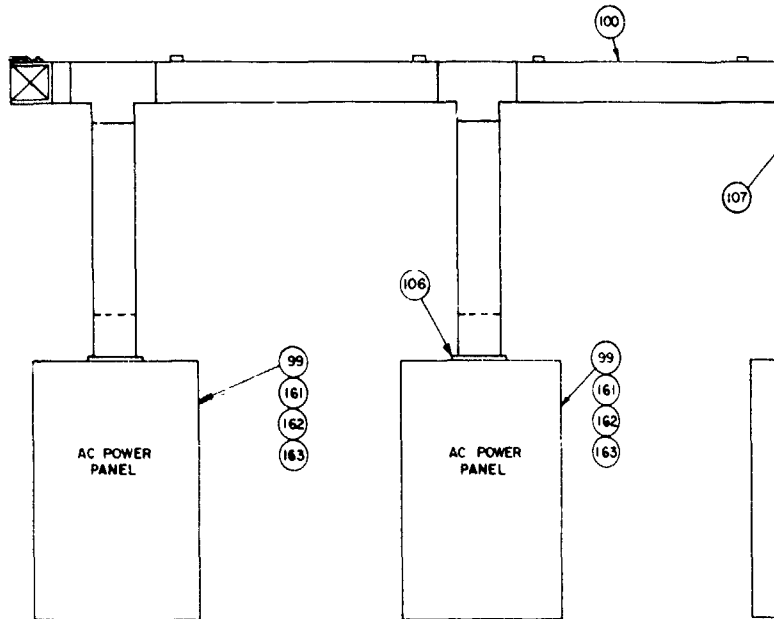
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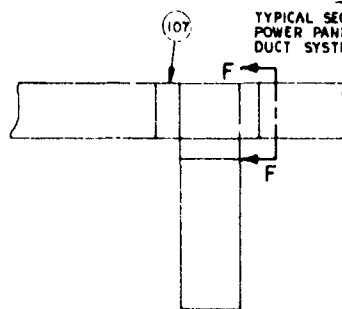
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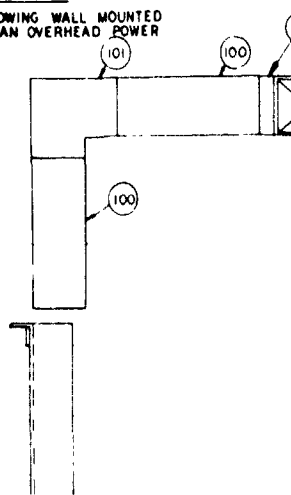
### SECTION C-C

TYPICAL SECTION SHOWING WALL MOUNTED POWER PANELS FOR AN OVERHEAD POWER DUCT SYSTEM

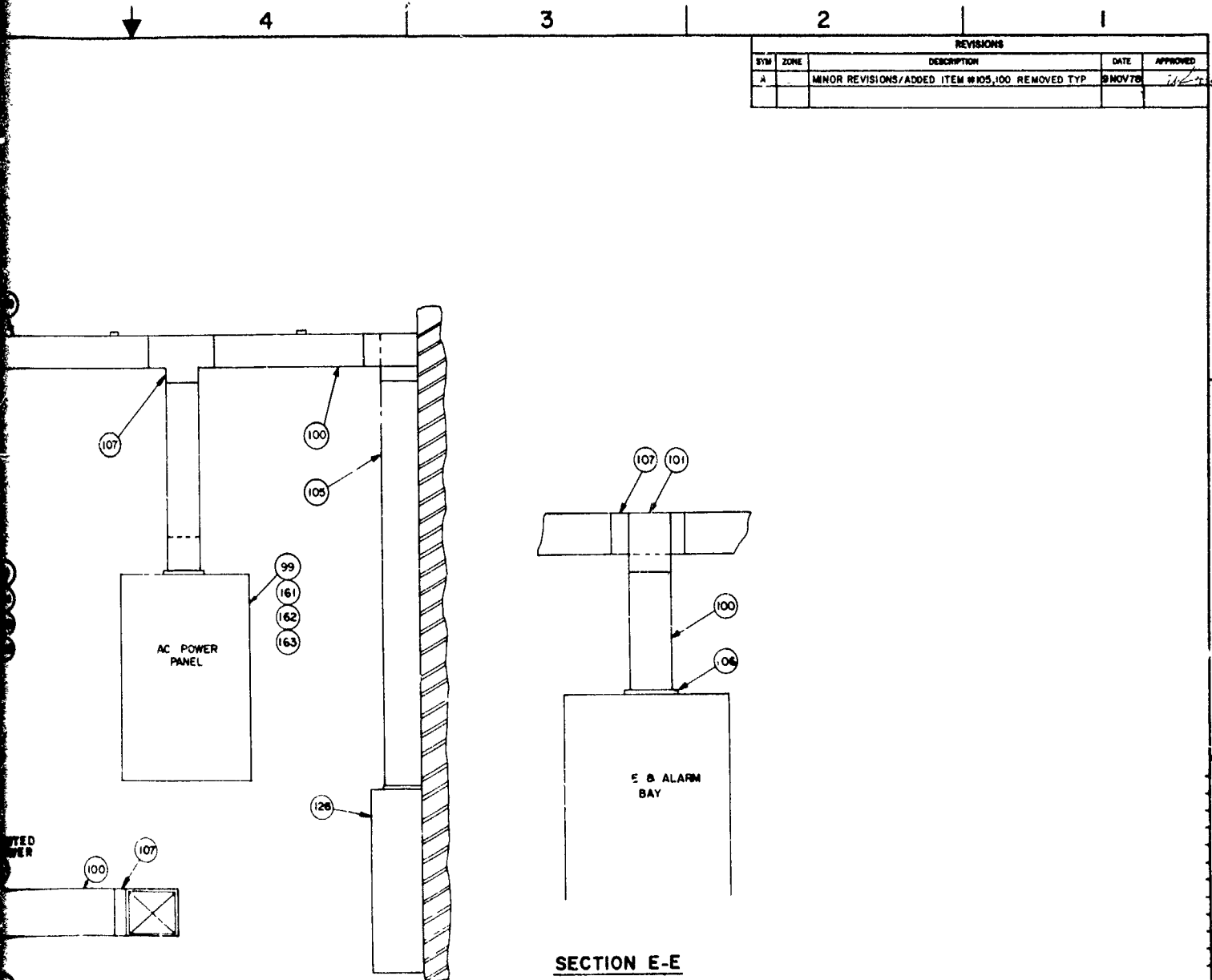


EQPT BAY  
POWER SUPPLIES

VIEW D-D

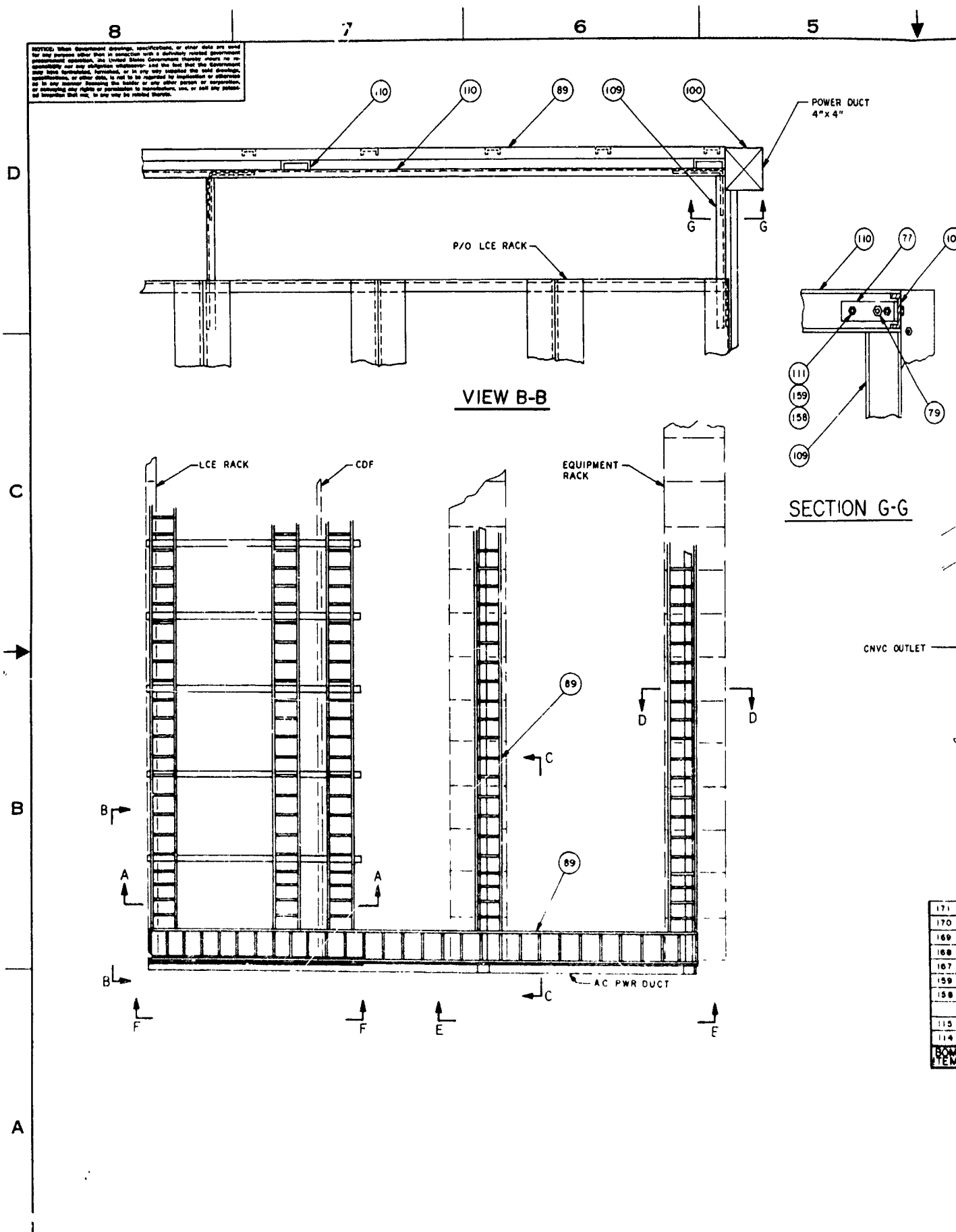


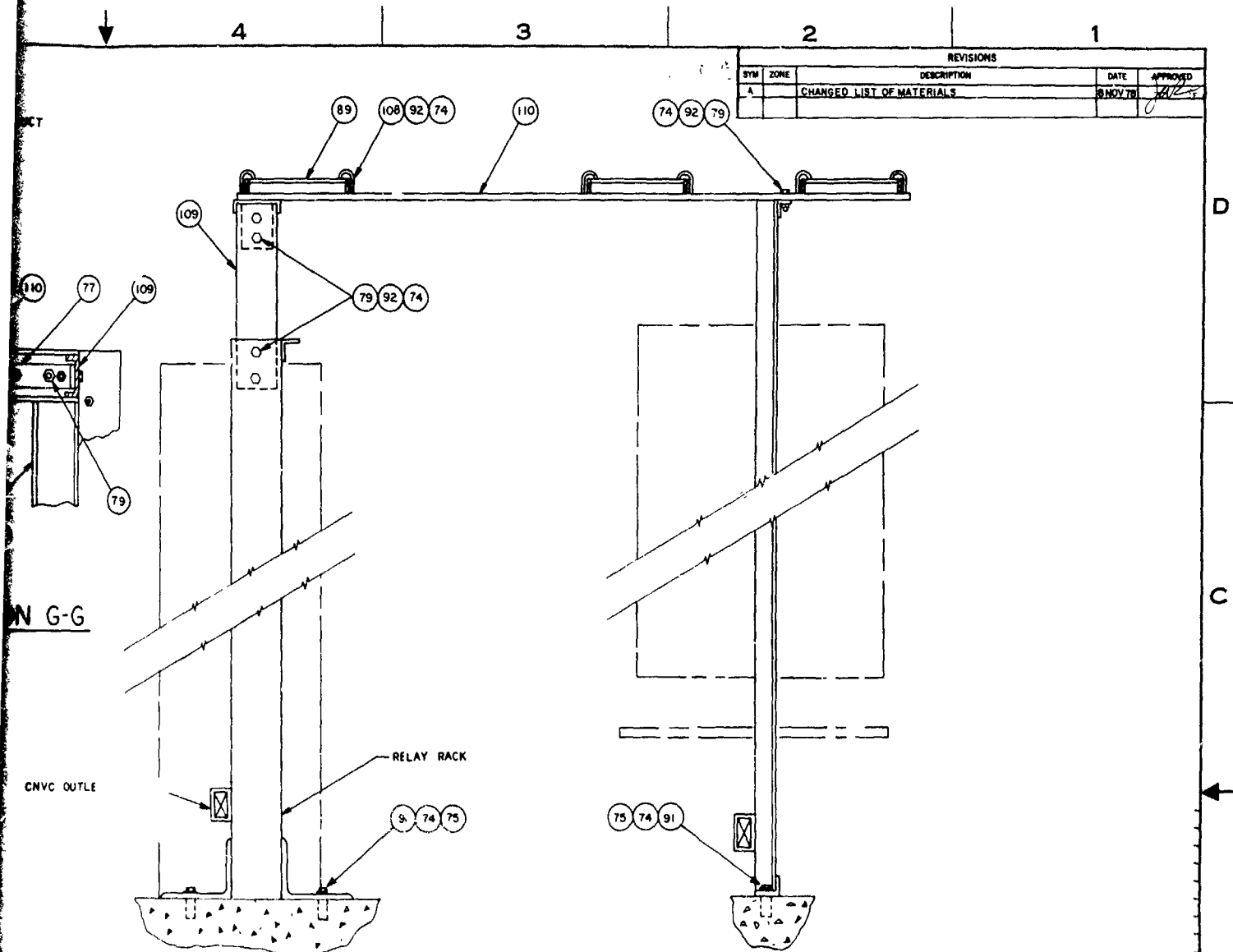
SECTION F-F



BOM ITEM	DESCRIPTION/PART NO	NSN/SPEC	U1	BOM NOTE
LIST OF MATERIALS				
ORGANIZATION USACEEIA-CED FORT MONROE, ARIZONA				
DESIGN BY J. RAMEY				
UNRAFTERMAN T. SAYE				
CHECKER <i>[Signature]</i>				
DATE 8 DEC 78				
ORGANIZATION APPROVAL <i>[Signature]</i>				
CODE 50430 D COM-TC03-U2				

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SECTION A-A

171	23563A	RECEPTACLE, G-30439			
170	23562Z	BLANK END FITTING, G-30108			
169	23561J	COVER, CLIP, G-3008			
168	23560K	WIRE CLIP, G-3000WC			
167	23559H	PLUG MOLD, G-30008			
159	00598H	NUT, HEX, 1/2" X 1/4" UNF			
158	08768A	WASHER, FLAT, 1/4" ID			
115	23511D	WASHER, FLAT, NO 10, 92917A135			13
114	23510C	NUT, HEX, 1/2" X 1/4" UNF			13
BOM ITEM	REL	DESCRIPTION/PART NO	NSN	UI	BOM NOTE

113	23509C	PHMS, 10-24 X 1/2", 90283A242			13
111	23508B	FM BOLT, 1/4"-20 X 1", 90232A542			13
110	23507A	ALUMINUM CHANNEL, 1 3/4" X 1/2" X 1/2" X 1/8"			13
109	23506Z	ALUMINUM CHANNEL, 1 1/2" X 1/2" X 1/2" X 1/8"			13
108	23505W	J-BOLT, 1/2"-13, P422023			15
107	08403K	POWER TEE, LD4T	5975-00-870-5783		16
101	23500L	POWER ELBOW, LD4BOL			16
100	23499C	POWER DUCT, 4" X 4" X 1", LD41WK			16
92	09237L	NUT, HEX 3/8"-16 UNF, STEEL, CAD PLTD			15
91	23490Y	BOLT, 3/8"-16 X 2 1/2", P403467			15
89	23488C	CABLE RACK, 20" W X 2" H, P401703			15
79	23479E	HH BOLT, 3/8"-16 X 1 1/4", 91469A626			13
77	23477C	FLAT CORNER BRACE, 6" X 6" X 1/4", 1556A15			13
75	00719E	EXPANSION ANCHOR, 3/8"-16 X 1 1/2", 5340-00-664-1343			13
74	23474Z	WASHER, FLAT, 3/8", 92141A031			12
72	02381Y	3/4" TRADE SIZE FLEX-CONDUIT, STEEL	5975-00-178-1223		12
67	052500	STRAIGHT BOX CONNECTOR, 5333			12
BOM ITEM	REL	DESCRIPTION/PART NO	NSN	UI	BOM NOTE

LIST OF MATERIALS

ORGANIZATION  
USACEIA-CED  
FORT HUACHUCA, ARIZONA

DESIGN BY J RAMEY  
DRAFTSMAN G OLSON  
CHECKER J RAMEY  
DATE 16 APR 76

BAY SUPPORTED  
CABLE RACK AND POWER DUCT  
INSTALLATION

ORGANIZATION APPROVAL

CODE IDENT NO. 50470

SIZE D

COM-TC03-113

APPROVAL

SCALE NONE

SHEET 1 OF 5

SHEET NUMBER

REVISION STATUS OF SHEETS

8

7

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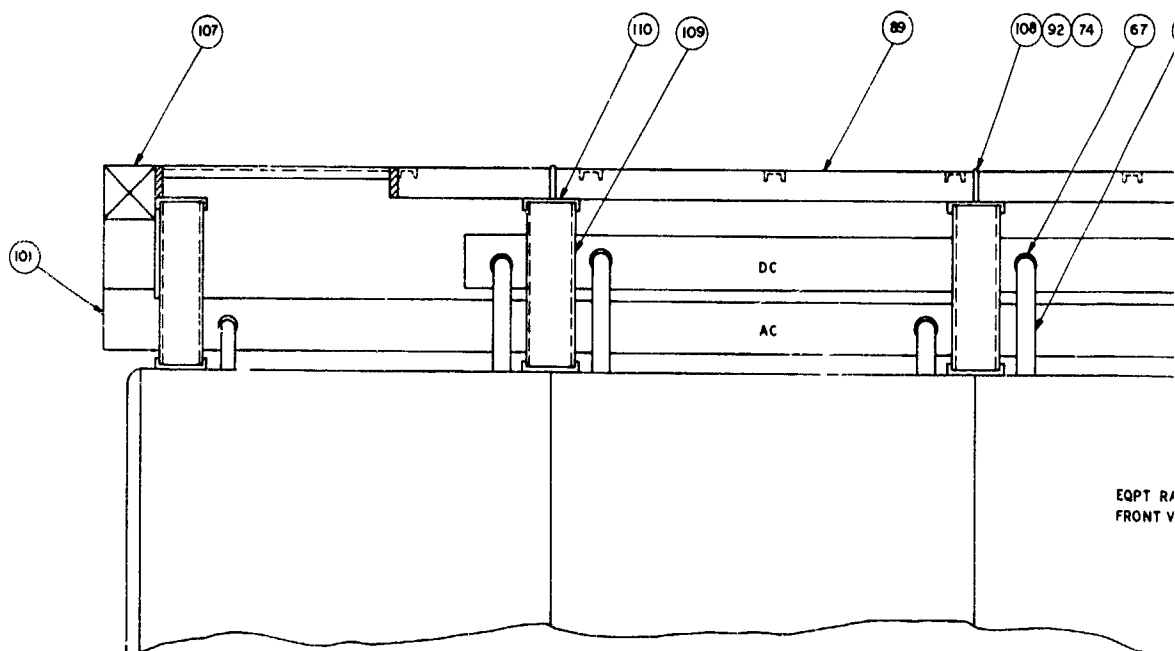
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SECTION C-C



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REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

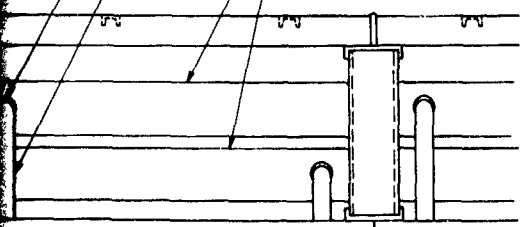
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92 74 67 72 100



EQPT RACK  
FRONT VIEW

ITEM	DESCRIPTION	FSN	UI	QTY			
LIST OF MATERIALS							
DESIGN BY J RAMEY		USACEEIA-CED FORT MANGRUDA, ARIZONA					
DRAFTSMAN M. BOLLACK							
CHECKER <i>[Signature]</i>							
DATE 15 APR 76							
ORGANIZATION APPROVE <i>[Signature]</i>		BAY SUPPORTED CABLE RACK AND POWER DUCT INSTALLATION					
CODE IDENT NO.		SIZE					



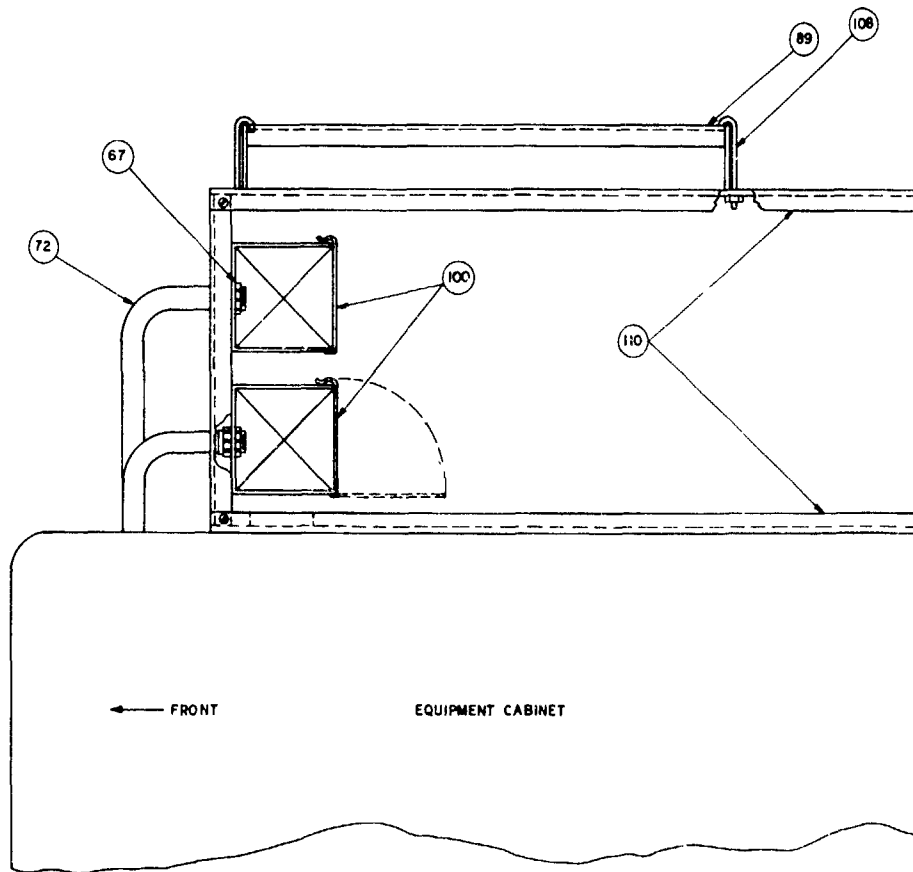
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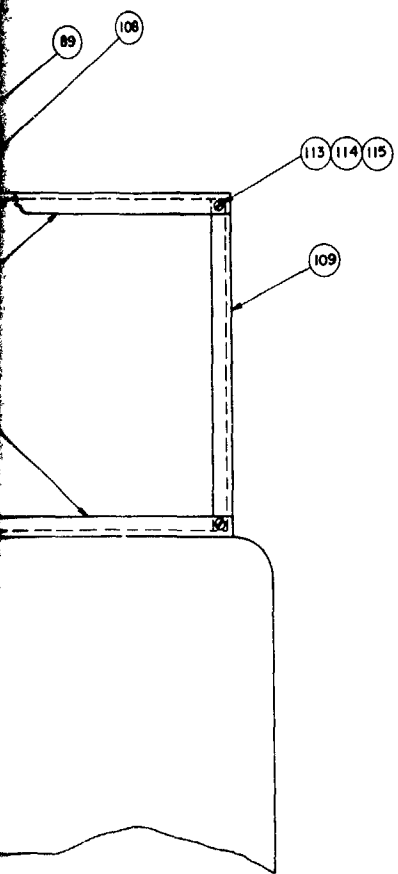
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SECTION D-D

5 4 3 2 1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REMOVE WOOD BRACE	2 OCT 76	<i>[Signature]</i>



D  
C  
B

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
		ORGANIZATION USAC/FIA-CED FORT HAM/2ND CA, ARBIAH		
DESIGN BY	J RAMEY	BAY SUPPORTED CABLE RACK AND POWER DUCT INSTALLATION		
DRAFTSMAN	M BOLLACK			
CHECKER	<i>[Signature]</i>			
DATE	15 APR 76			
ORGANIZATION APPROVAL <i>[Signature]</i>		CODE IDENT NO.	SIZE	COM-TC03-113
		50470	D	

A

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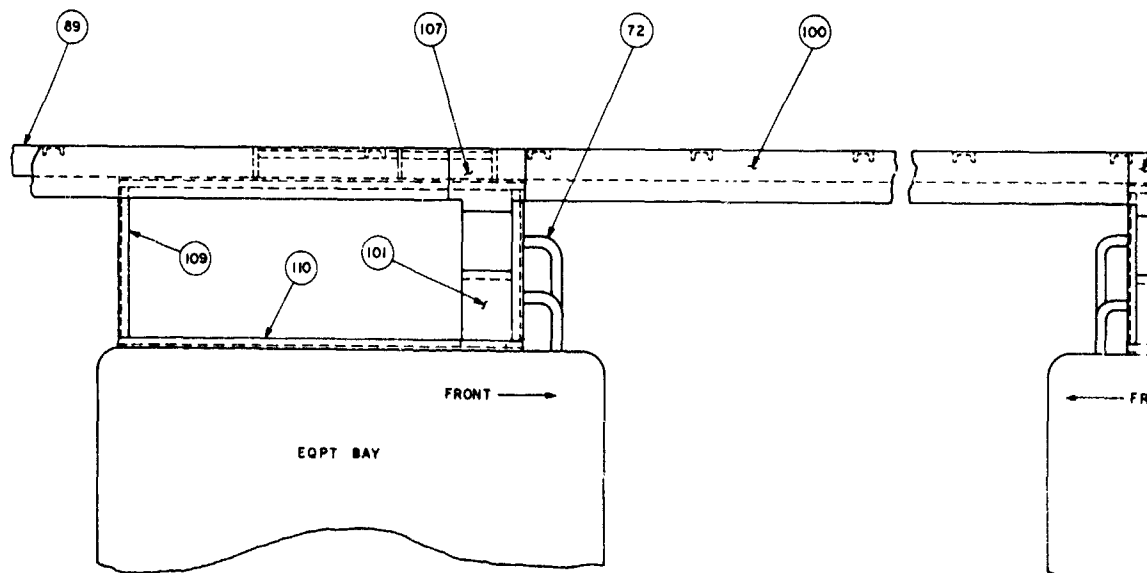
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VIEW E-E

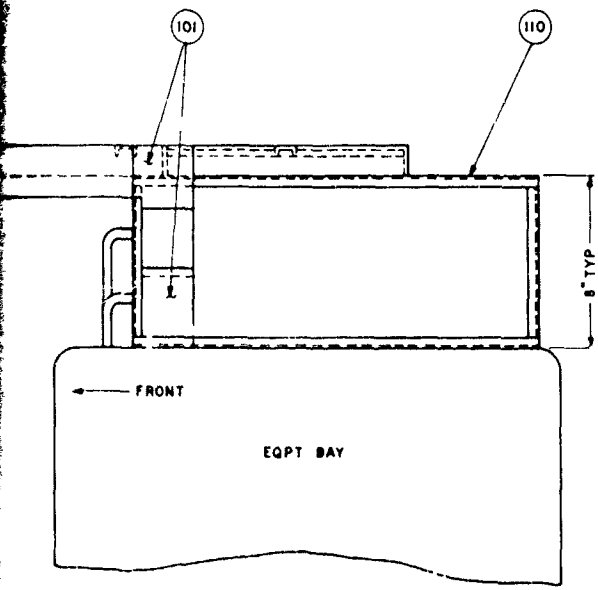
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REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REMOVE WOOD BRACE	20C178	<i>[Signature]</i>

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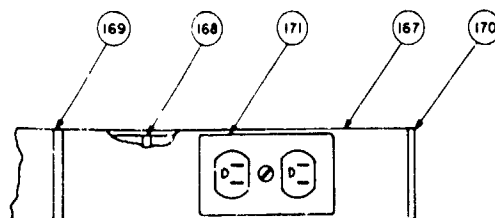
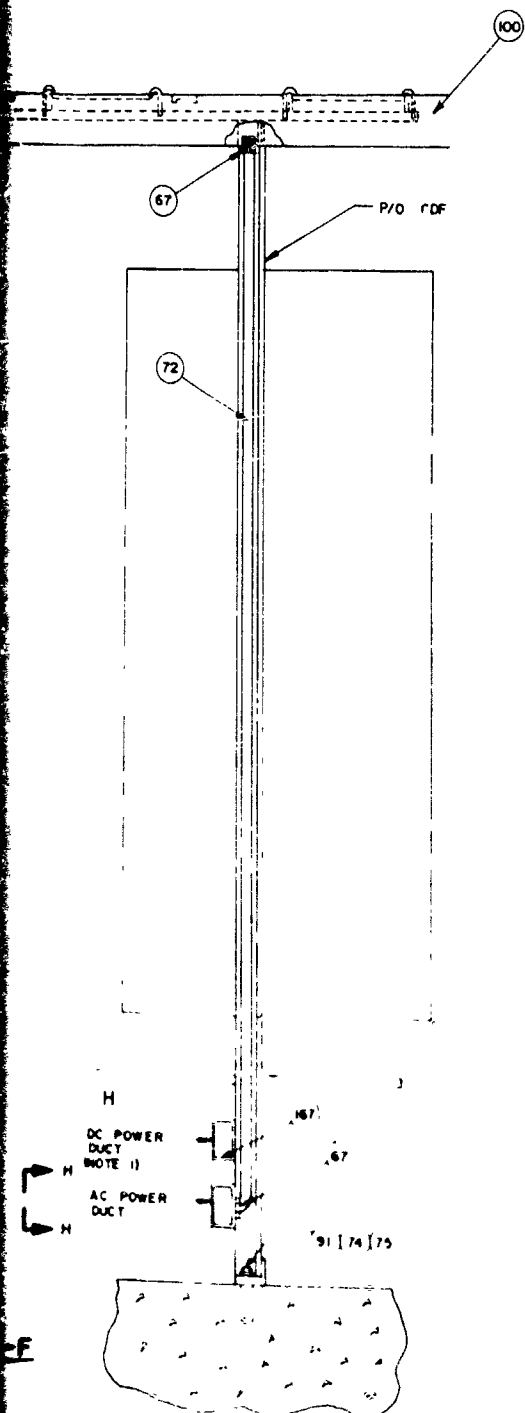
ITEM	DESCRIPTION	FSA	UI	QTY
LIST OF MATERIALS				
		USACEEIA-CED FORT HANCOCK, ARIZONA		
DESIGN BY	J RAMEY	BAY SUPPORTED CABLE RACK AND POWER DUCT INSTALLATION		
DRAFTSMAN	J KALLBERG			
CHECKER	<i>[Signature]</i>			
DATE	15 APR 76			
ORGANIZATION APPROVAL	<i>[Signature]</i>	50470	D	COM-TC03-113

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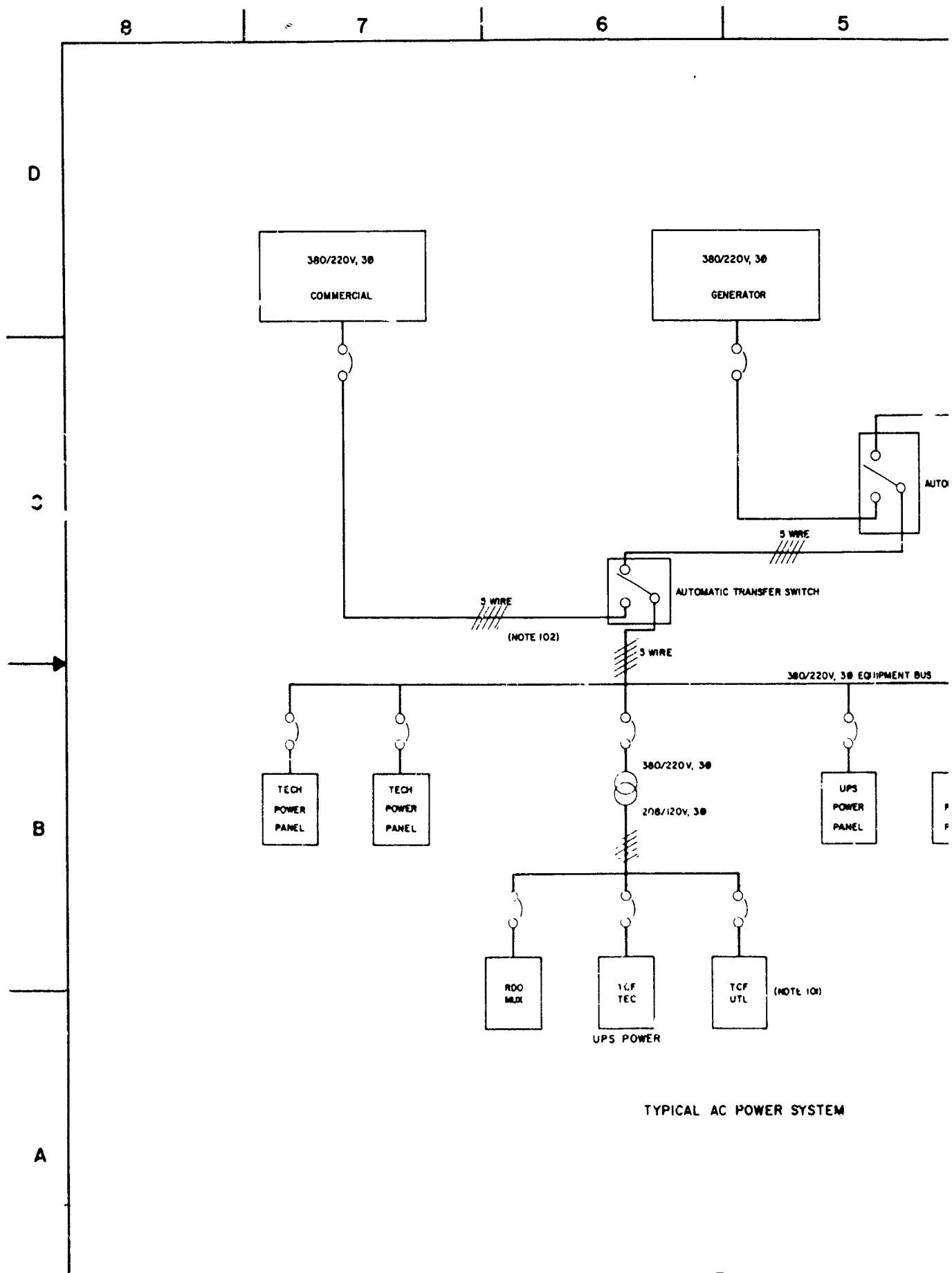


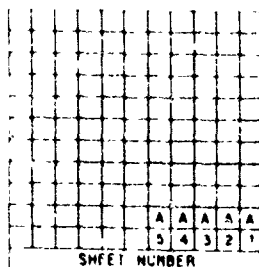
REVISIONS			
SYM	ZONE	DESCRIPTION	DATE



VIEW H-H

ITEM	DESCRIPTION	FSN	U1	QTY
LIST OF MATERIALS				
USACEEIA-CED FORT HARRISON, ARIZONA				
DESIGN BY MR. KANEY		BAY SUPPORTED CABLE RACK AND POWER DUCT INSTALLATION		
DRAFTSMAN T. DATE				
CHECKER J. DATE				
DATE 4 DEC 75				
CODE NIGHT HLL BGR				





DESIGN NO		ORGANIZATION U S ARMY COMMUNICATIONS - ELECTRONICS ENGINEERING INSTALLATION AGENCY	
DESIGNED BY J RAMEY	YCLT 78	AC POWER WIRING	
DRAWN BY S GILL	7 NOV 78		
CHECKED BY [Signature] [Signature]	1 JAN 79		
EXPLANATION ALL CHG RET		SIZE PSCM NO D 50470	DRAWING NO COM-TC03-114
		SCALE NONE	NO. OF SHEETS 1 OF 4



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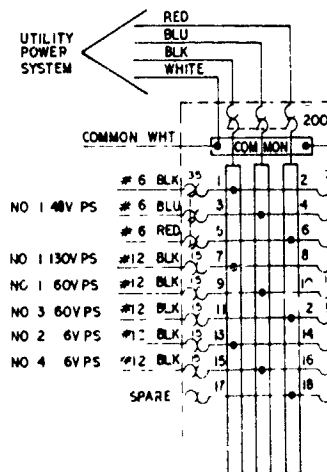
D

C

B

A

FROM				TO				WIRING INSTRUCTION	
PANEL	PHASE	AMP	POS	EQUIPMENT	BAY	AWG	COLOR	DETAIL	SHEET
TP1	1, 2, 3	25	1, 3, 5	48V PS NO 1	1 21	NO 10	RED, BLU, BLK	A	2
	1, 2, 3	25	1, 3, 5	48V PS NO 1	1 21	NO 10	RED, BLU, BLK	A	2
	1	15	7	130V PS NO 1	2 22	NO 12	WHT, BLK, GRN	B	
	1		8	130V PS NO 2	2 22				
	2		9	60V PS NO 1	2 22				
	2		10	60V PS NO 2	2 22				
	3		11	60V PS NO 3	2 22	NO 12		B	
	3		12	6V PS NO 1	1 13	NO 16		C	
	1		13	6V PS NO 2	1 13				
	1		14	6V PS NO 3	1 13				
TP1	2	15	15	6V PS NO 4	1 13	NO 16	WHT, BLK, GRN	C	
	2	15	16-36	SPARE					
TP2	1	15	1	VFCT NO 1	3 14	NO 12	WHT, BLK, GRN	D	
	1		2		3 15				
	2		3		3 16				
	2		4		3 17				
	3		5		3 18				
	3		6		3 19				
	1		7		3 20				
	1		8		3 21				
	2		9		3 22				
	2		10		3 23				
	3		11		3 24				
	3		12	VFCT NO 12	3 25	NO 12	WHT, BLK, GRN	D	
TP2	1	15	13-36	SPARE					
UT1	1	15	1	QA NO 1	2 5	NO 12	WHT, BLK, GRN	E	
	1		2	QA NO 2	2 4				
	2		3	QA NO 3	2 5				
	2		4	QA NO 4	2 6	NO 12	WHT, BLK, GRN	E	
	3		5	SPARE					
	3		6	DC / T H/L	2 24	NO 12	WHT, BLK, GRN	E	
	1		7	DC / T H/L	1 13				
	1		8	CONV ODD	ROW 1				
	2		9	CONV EVEN	ROW 1				
	2		10	CONV ODD	ROW 2				
	3		11	CONV EVEN	ROW 2				
	1		12	CONV ODD	ROW 3				
UT1	1	15	13	CONV EVEN	ROW 3	NO 12	WHT, BLK, GRN	E	



## NOTES

201 COM

202 GRO

METHOD - A

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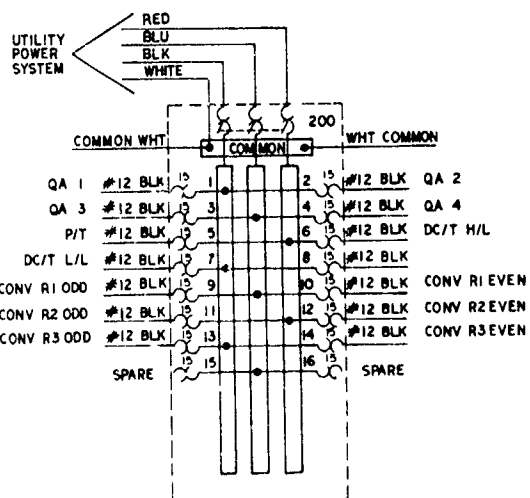
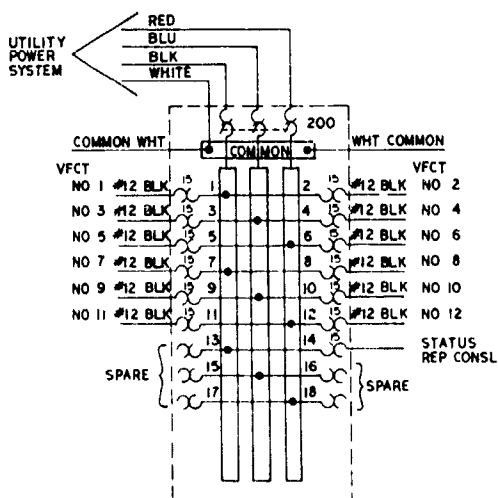
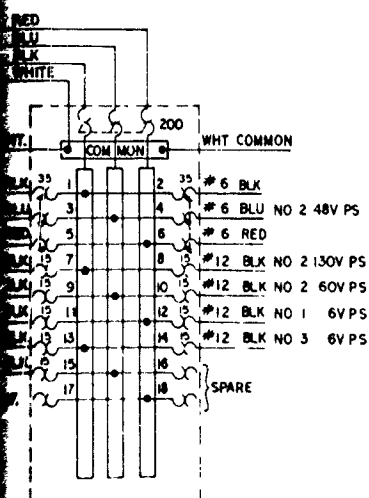
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REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS, CHANGED COLOR CODES, NOTE SYMBOLS, SHEET NUMBER WAS 1 OF 4	7 NOV 78	<i>for</i>



### METHOD - B

(NOTE 201 AND 202)

### NOTES

- 201 COMMON WIRE SHALL BE WHITE  
202 GROUND (3RD WIRE) SHALL BE GREEN

ITEM	DESCRIPTION	FSW	UI	QTY
LIST OF MATERIALS				
ORGANIZATION				
USACEEIA-CED				
FORT HANCOCK, ARIZONA				
DESIGN BY J RAMEY				
DRAFTSMAN M BOLLACK				
CHECKER <i>[Signature]</i>				
DATE 16 APR 78				
ORGANIZATION APPROVAL <i>[Signature]</i>				
TC03-103		JEP 006		
CODE IDENT NO		50470		
SIZE		D		
COM-TC03-114				



5

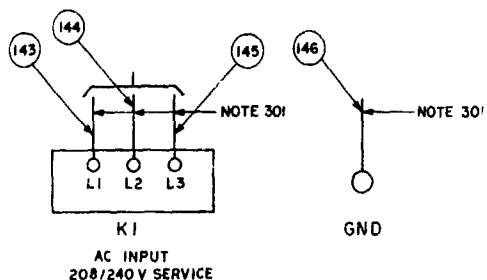
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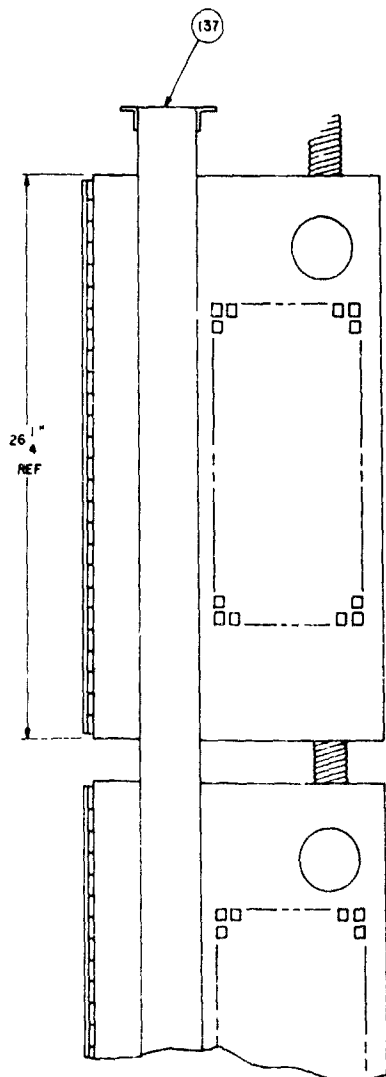
REVISIONS				
SYN	ZONE	DESCRIPTION	DATE	APPROV
A		MINOR REVISIONS, SHEET NUMBER WAS 2 OF 4	7 NOV 78	<i>gpl</i>



AC INPUT			
TERM CAP	VOLTAGE	RECM WIRE SIZE	RECM FUSING
14-6 GA	208/240	10 GA	(3) 25 AMP

GROUND	
TERM CAP	RECM WIRE SIZE
14-6 GA	8 GA

### INSTALLERS CONNECTIONS



SIDE VIEW

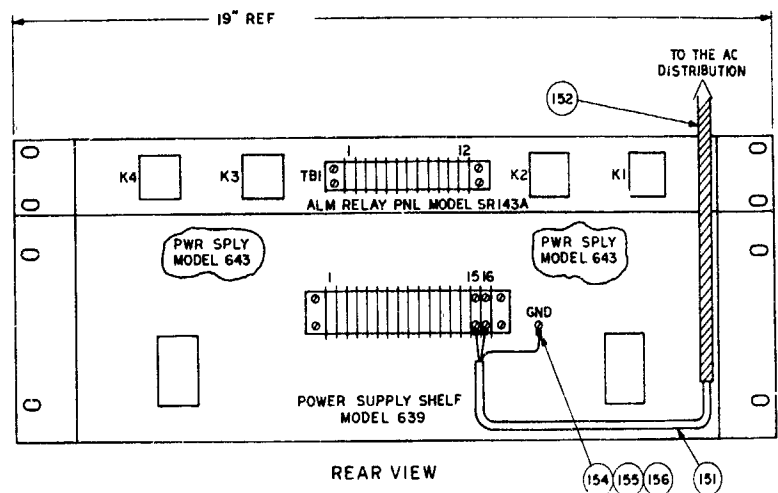
### NOTES:

301 POWER LEADS TO BE RUN BY INSTALLER

302 IF LOAD SHARING IS DESIRED, TERMINAL 3 ON TERMINAL STRIP TBS IS A FLOTROL RECTIFIER LOAD SHARING TERMINAL. IF THIS FLOTROL RECTIFIER IS TO BE PARALLELED WITH ANOTHER FLOTROL RECTIFIER THAT HAS A COMPATIBLE LOAD SHARING CIRCUIT, CONNECT LOAD SHARING TERMINAL 3 TO SIMILAR LOAD SHARING TERMINAL IN EACH FLOTROL TO BE PARALLELED USING ITEM NUMBER 147

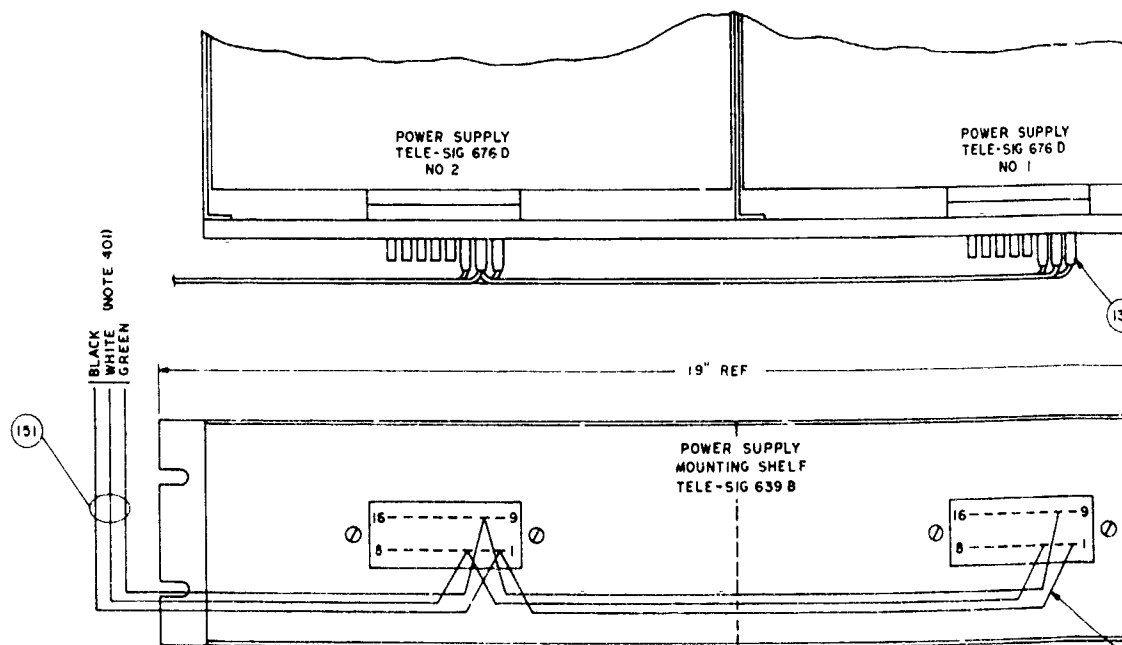
ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
DESIGN BY J RAMEY		USACEEIA-CED		
DRAFTSMAN J KALLBERG		PORT HANCOCK, ARIZONA		
CHECKER <i>B. Ramey</i>		AC POWER WIRING		
DATE 16 APR 76				
ORGANIZATION APPROVAL <i>[Signature]</i>		CODE IDENT NO.	SIZE	
APPROVAL		50470	D	COM-TC03-114

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REAR VIEW  
DETAIL B

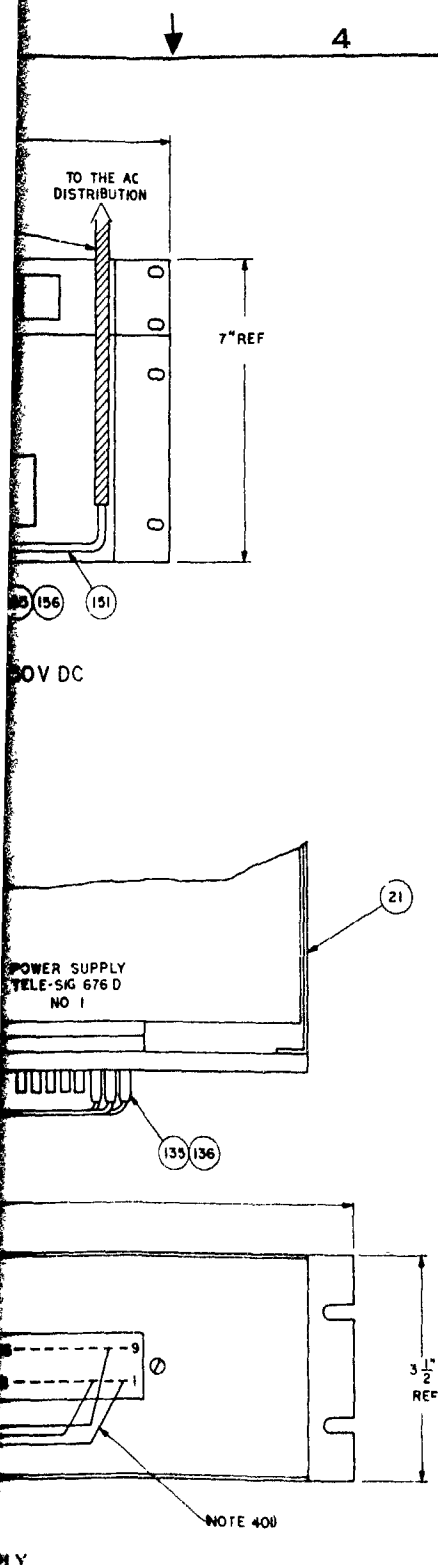
TYPICAL AC WIRING INSTALLATION FOR  $\pm 60, \pm 130V$  DC  
POWER SUPPLY ASSEMBLY (MODEL 2222A)  
(NOTE 401, 402)



REAR VIEW OF THE TELE-SIG POWER SUPPLY  
MOUNTING SHELF (MODEL 639 B)

INPUT POWER STRAPPING OPTIONS		
INPUT VOLTAGE	POWER TRANSFORMER STRAPS	AC POWER FUSE SIZE
115 V AC	PINS 1, 3 AND 10	2 AMPERE
115 V AC	PINS 2, 4 AND 10	2 AMPERE
230 V AC	PINS 2, 3 AND 10	1 AMPERE

DETAIL C



REVISIONS				
SYB	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS, SHEET NUMBER WAS 3 OF 4, CHANGED NOTE SYMBOLS	7 NOV 78	<i>jal</i>

NOTES:

- 401 FOR LOAD SHARING STRAP PINS 1,3 AND 10 OF CONNECTOR NO 1 TO PINS 1,3 AND 10 OF CONNECTOR NO. 2
- 402 THIS UNIT IS FACTORY WIRED FOR 130V UNLESS OTHERWISE SPECIFIED TRANSFORMER T1 MAY BE RESTRAPPED FOR OTHER INPUT VOLTAGES. FOR OPTIONAL STRAPPING SEE INSTRUCTION MANUAL SUPPLIED WITH THE UNIT.

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
ORGANIZATION		USACEEIA-CED FORT HUMPHUCA, ARIZONA		
DESIGN BY	J RAMEY	AC POWER WIRING		
DRAFTSMAN	J KALLBERG			
CHECKER	<i>By Raych</i>			
DATE	19 APR 76			
ORGANIZATION APPROVAL	CODE IDENT NO.	SIZE	COM-TC03-114	
APPROVAL	50470	D		
SCALE NONE		SHEET 4 OF 5		

FUSE SIZE
PERE
PERE
PERE

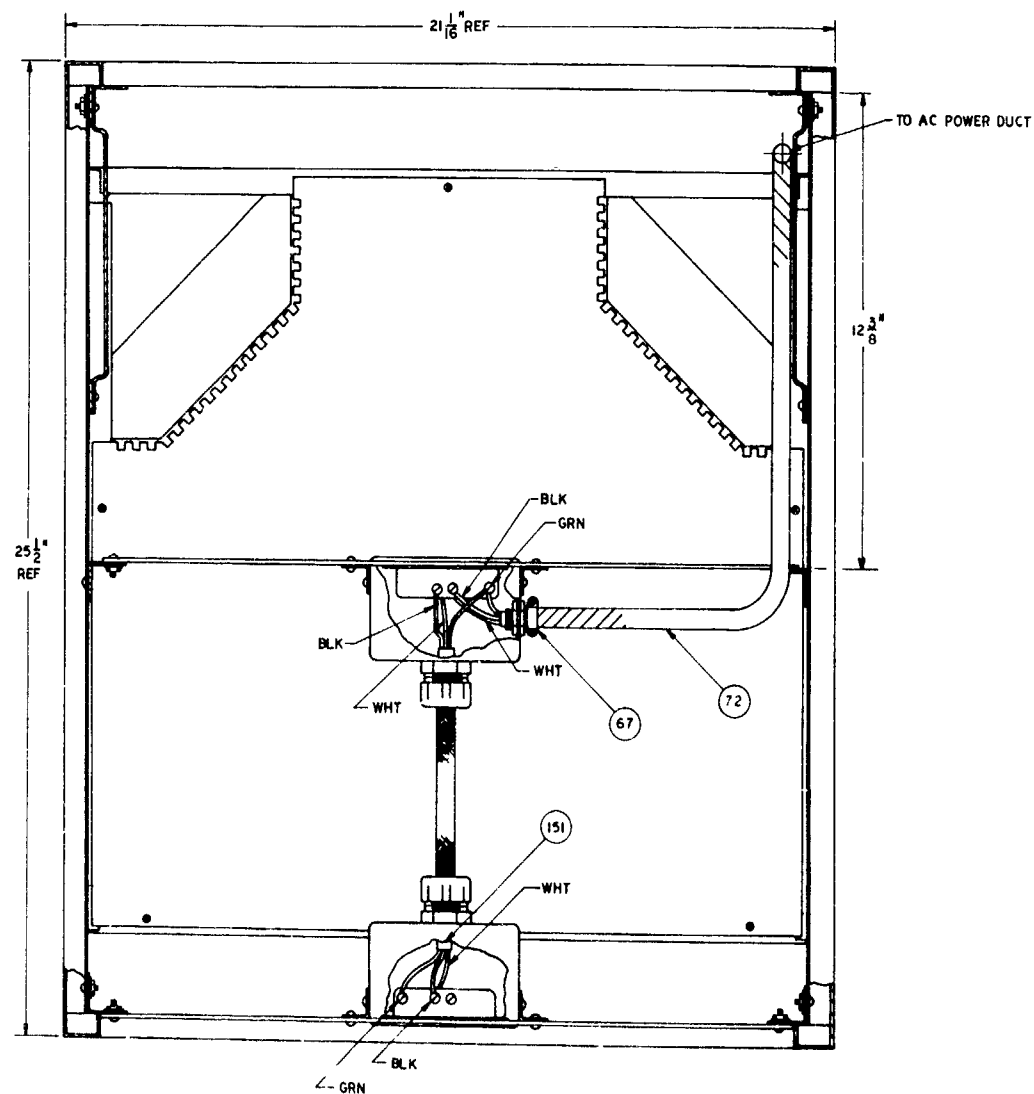
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D

C

B

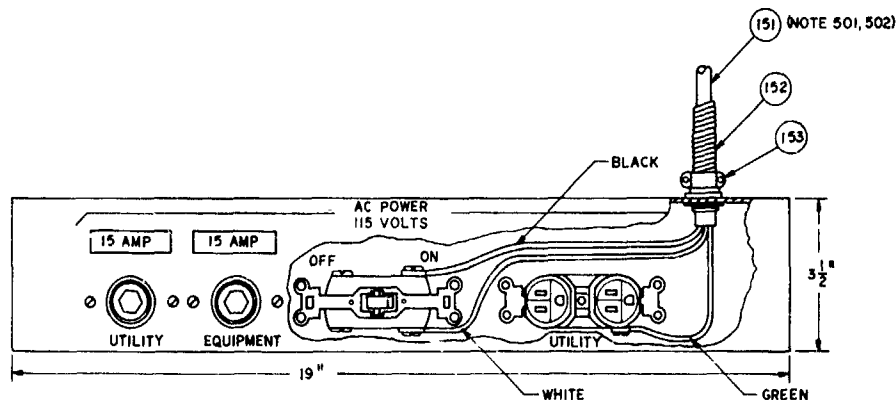
A



### DETAIL E

TYPICAL AC WIRING INSTALLATION  
FOR BAYS 23, 24, 25, 26, 27, 28 AND 113;  
ROWS 1, 2 AND 3

REVISIONS		DATE	APPROVED
SYM	ZONE	DESCRIPTION	
A		MINOR REVISIONS, SHEET NUMBER WAS 4 OF 4, CHANGED NOTE SYMBOLS	7 NOV 76 <i>Jak</i>



DETAIL D  
 POWER DISTRIBUTION PANEL ASSY  
 (1 A 24)

AC POWER INPUT FOR AN/FCC-57 AND AN/FCC-68	
POWER REQUIREMENTS	115 VAC 50 TO 400 Hz 5 AMP (MAX)

NOTES.

- 501 REFERENCE TECHNICAL MANUAL TM 11-5805-496-15  
 502 SOME PLUG-IN AND RACK-MOUNTED UNITS MUST BE STRAPPED FOR THE PRIMARY POWER VOLTAGE USED (SEE TABLE 2-8 OF THE ABOVE REFERENCE TM)

ITEM	DESCRIPTION	FSN	UI	QTY	
LIST OF MATERIALS					
DESIGN BY J RAMEY		USACEIA-CED FORT HUACHUCA, ARIZONA			
DRAFTSMAN M BOLLACK		AC POWER WIRING			
CHECKER <i>A. Berzoch</i>					
DATE 19 APR 76					
ORGANIZATION <i>USACEIA</i>		QUANTITY NO. 50470	SIZE D	FORM-TC03-114	
APPROVAL <i>[Signature]</i>					

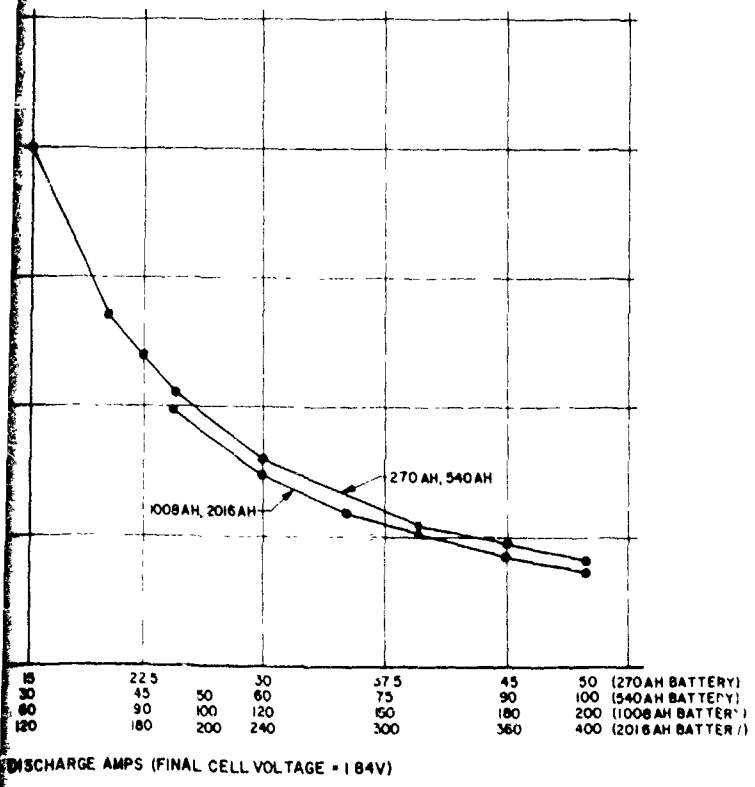




REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN	9 NOV 78	<i>[Signature]</i>

**NOTES:**

- 101. RECTIFIERS PROVIDE 1% REGULATION \*OR 48.3-58.8 VOLTS OUT
- 102. BATTERY PACKAGES COME COMPLETE WITH HARDWARE MAINTENANCE ITEMS AND CATALYTIC CONVERTER CAPS



6	5	4	3	2	1
A	A	A	A	A	A
SHEET NUMBER					
REVISION STATUS OF SHEETS					

181	06836E	HEAT SHRINKABLE TUBING FIT 105-3/16			
178	23568F	CONNECTOR 513225 60 PIN			
175	23567E	CONNECTOR 513936 100 PIN	9835-00-798-3442		
174	23568D	CONNECTOR 512241 60 PIN			
173	23565C	SHRINKABLE TUBING FIT 105-11/2			
ITEM	AEL	DESCRIPTION	NSN	UI	QTY
<b>LIST OF MATERIALS</b>					
IDENT NO		ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY			
DESIGNED BY		DRAWN BY			
CHECKED BY		APPROVED BY			
DESIGN ACTIVITY		48V DC POWER SYSTEM AND DISTRIBUTION			
NEXT ASSEMBLY		USED ON		SIZE	
DWG INDEX NO.		SCALE		DRAWING NO	
		NONE		50470	
				COM-TC03-115	
				1 OF 6	

# ERRATA SHEET

SEIP 006, TECHNICAL CONTROL FACILITY

1 October 1979

SPECIFY BY THIS NUMBER + LIST NUMBER							5822-027	LIST NO.
MODEL	VOLTS	AC/DC	PHASE	VDLTS	AMPS			
RL 50 F 50	120/200/240	50/60	1 Ø	50	50			1
RPM 100 C 50	380/400	50/60	3 Ø	50	100			2
RPM 200 C 50	380/400	50/60	3 Ø	50	200			3
RL 100 F 50	120/200/240	50/60	1 Ø	50	100			4
RPM 100 D 50	208/220/240	50/60	3 Ø	50	100			5
RPM 200 D 50	208/220/240	50/60	3 Ø	50	200			6
RPM 400 C 50	380/400	50/60	3 Ø	50	400			7
RPM 400 D 50	208/220/240	50/60	3 Ø	50	400			8

## RECTIFIER SELECTION GUIDE (NOTE 101)

Replace the Rectifier Selection Guide on drawing COM-TC03-115 Sheet 1 of 6 with this table. Future printings of this document will contain the corrected drawing.



sk

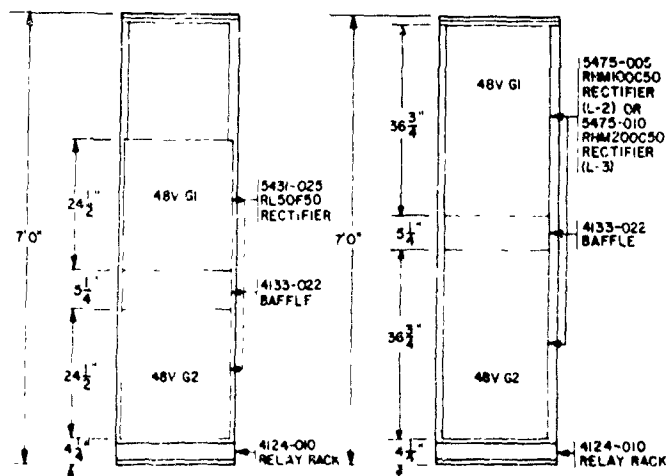
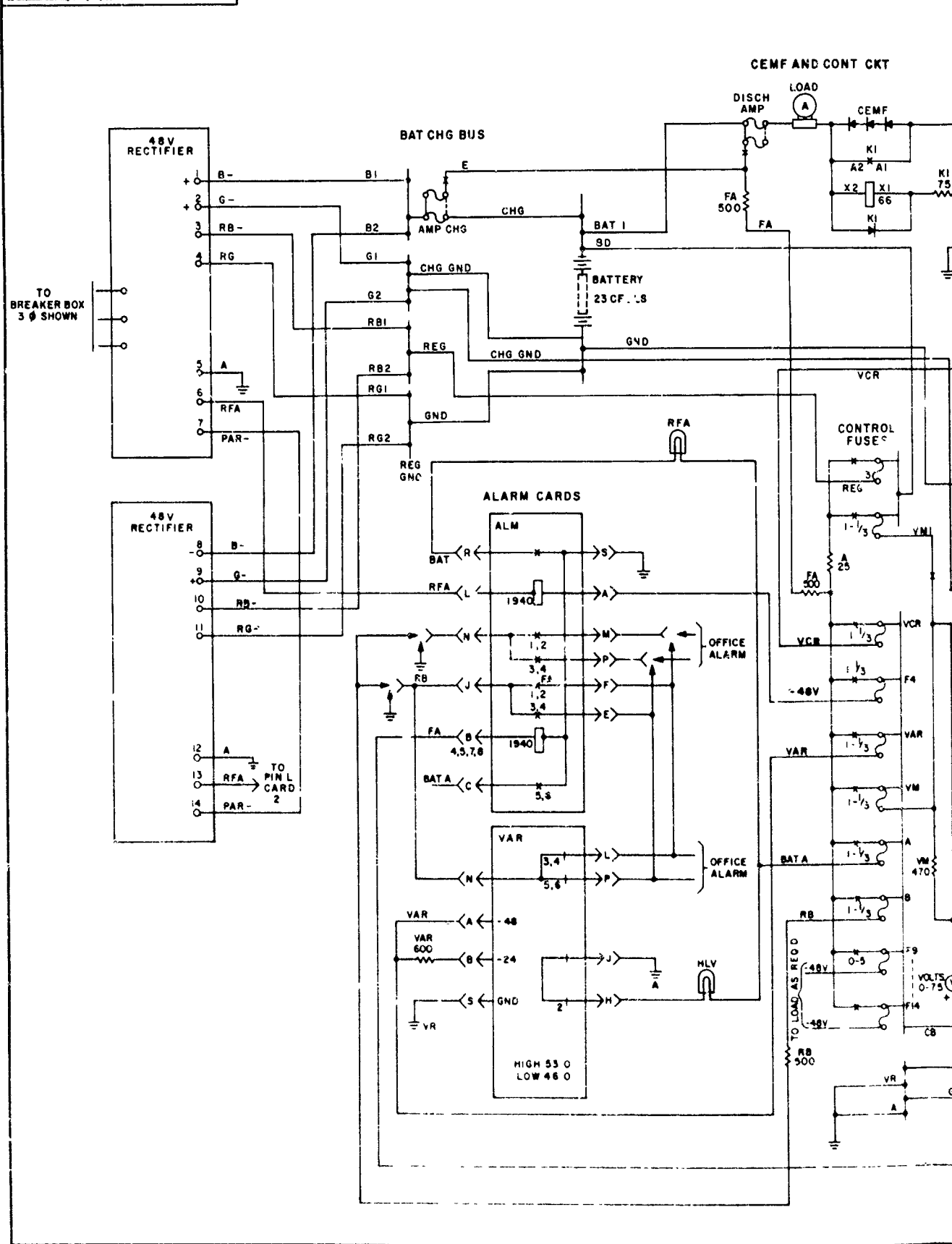


FIG 3  
RECTIFIER BAY



✓. 121

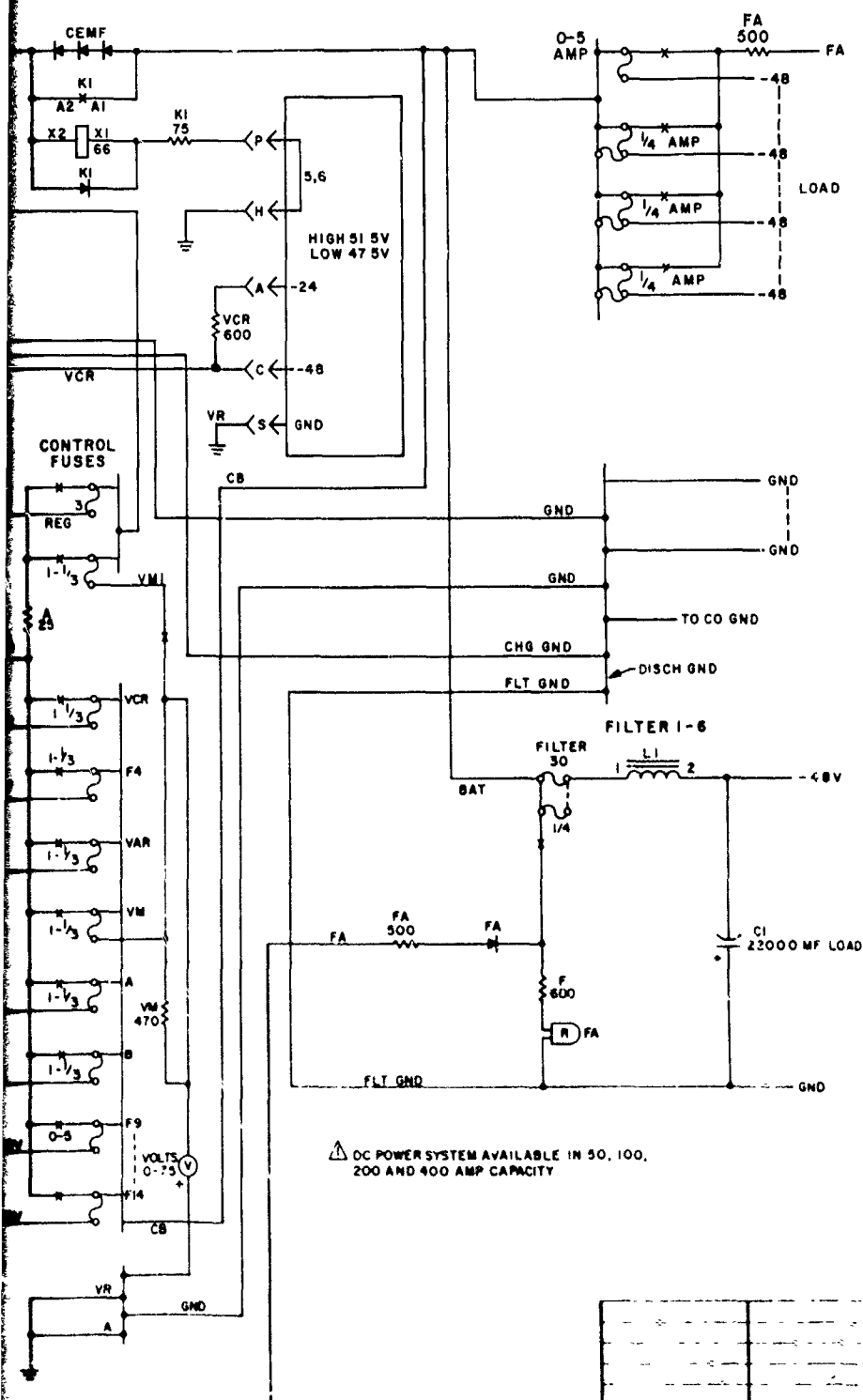
The diagram shows two 48V Rectifier units. The first unit has terminals 1 through 7. Terminal 1 is labeled 'B-' and has a '+' sign. Terminal 2 is labeled 'G-' and has a '+' sign. Terminal 3 is labeled 'RB'. Terminal 4 is labeled 'RG'. Terminal 5 is labeled 'A'. Terminal 6 is labeled 'RF'. Terminal 7 is labeled 'PA'. A label 'TO BREAKER BOX 3 Ø SHOWN' points to three open terminals on the left side of the unit. The second unit has terminals 8 through 14. Terminal 8 is labeled 'I'. Terminal 9 is labeled 'O' and has a '+' sign. Terminal 10 is labeled 'O'. Terminal 11 is labeled 'O'. Terminal 12 is labeled 'A'. Terminal 13 is labeled 'RF'. Terminal 14 is labeled 'PA'.



REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN	9 NOV 78	<i>[Signature]</i>

CONT. CKT

DISTRIBUTION



⚠ DC POWER SYSTEM AVAILABLE IN 50, 100, 200 AND 400 AMP CAPACITY

# LIST OF MATERIALS

IDENT NO		ORGANIZATION	
		U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY	
DESIGNED BY	J. HANNEY	DATE	2 NOV 78
DRAWN BY	J. STATHIS	DATE	2 NOV 78
CHECKED BY	J. HANNEY	DATE	2 NOV 78
APPROVED BY	J. HANNEY	DATE	2 NOV 78
NEXT ASSEMBLY		USED ON	
DWG INDEX NO		DESIGN ACTIVITY	
		CCC-CED XET	
		SIZE/PCB NO	
		D	
		DRAWING NO	
		COM-TC03-115	
		SCALE	
		1" = 1" PART 3 OF 6	

48VDC POWER SYSTEM AND DISTRIBUTION

8

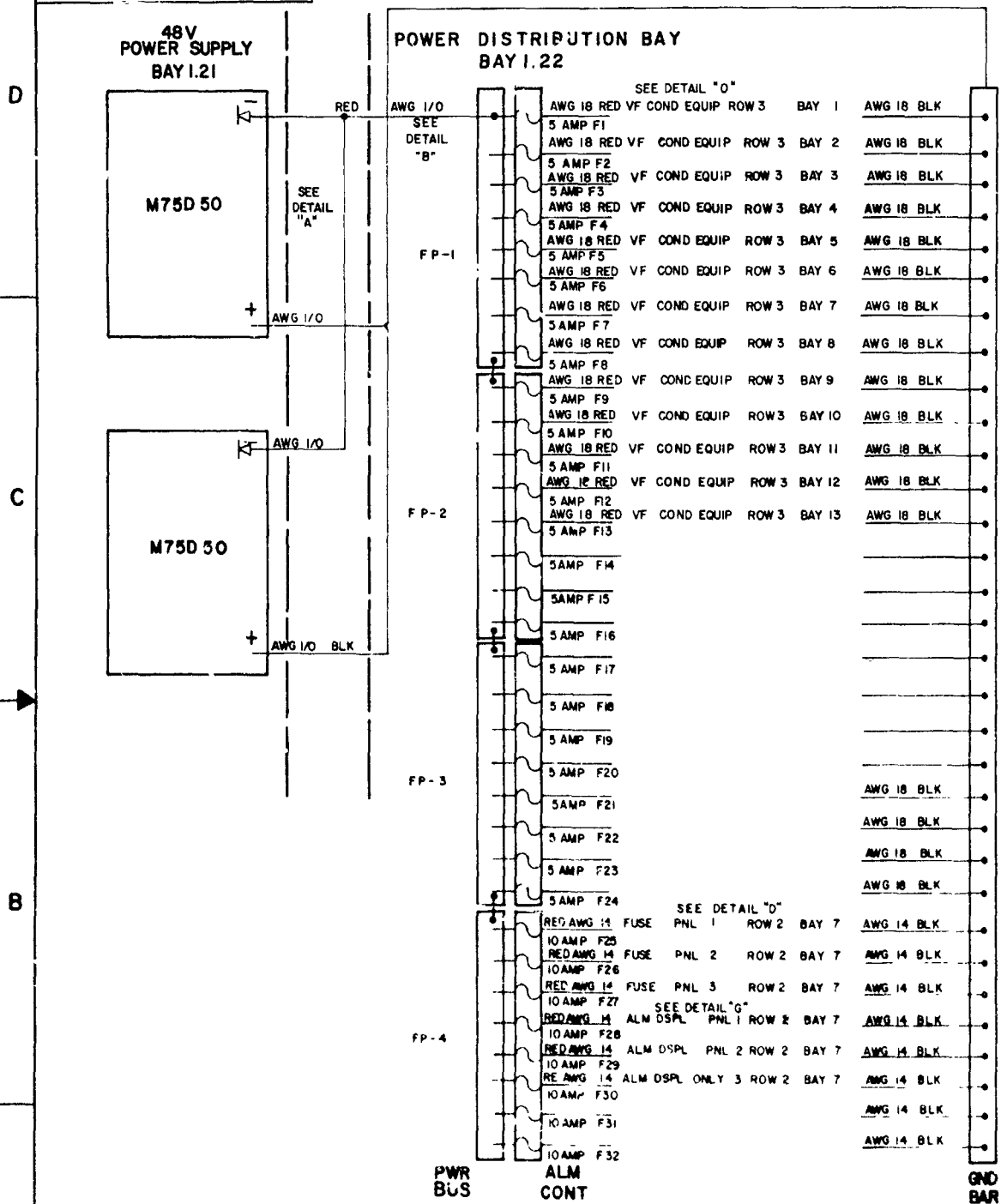
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# 48V DC POWER DISTRIBUTION

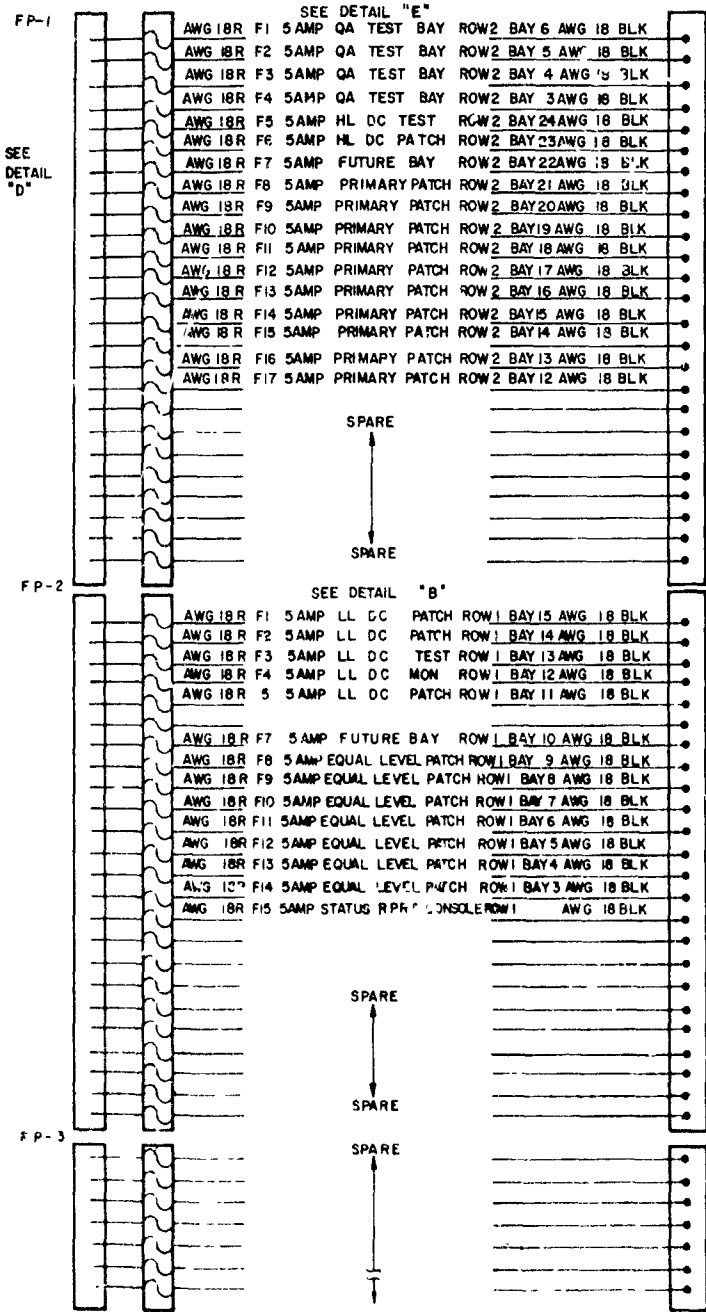


SIMPLIFIED DC POWER RUNNING LIST



REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REMOVED LIST OF MATERIALS, CHANGED TITLE AND SHEET NUMBER CHANGED	9 NOV 78	<i>[Signature]</i> EDS

# FUSE BAY 207



RUNNING LIST

LIST OF MATERIALS				
		ORGANIZATION		
		USACEEIA-CED		
		FORT HUACHUCA, ARIZONA		
		DESIGN BY J RAMEY		
		DRAFTSMAN L A KAUFMAN		
		CHECKER <i>[Signature]</i>		
		DATE 20 JAN 1976		
		ORGANIZATION APPROVAL		
TC03 103	SETP 006	CODE IDENT NO.	50470	COM-TC03-115
NEXT ASSY	USED ON	APPROVAL	SCALE NONE	SHEET 4 OF 6

## LIST OF MATERIALS

ORGANIZATION  
USACEEIA-CED  
FORT HUACHUCA, ARIZONA

DESIGN BY J RAMEY  
DRAFTSMAN L A KAUFMAN  
CHECKER *[Signature]*  
DATE 20 JAN 1976  
ORGANIZATION APPROVAL

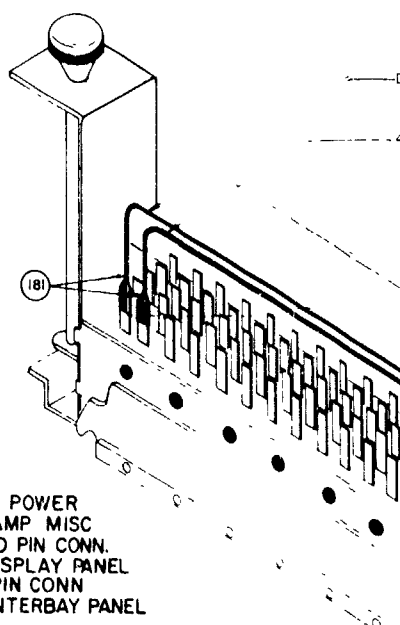
48V DC POWER SYSTEM AND DISTRIBUTION

CODE IDENT NO. 50470  
D COM-TC03-115

SCALE NONE

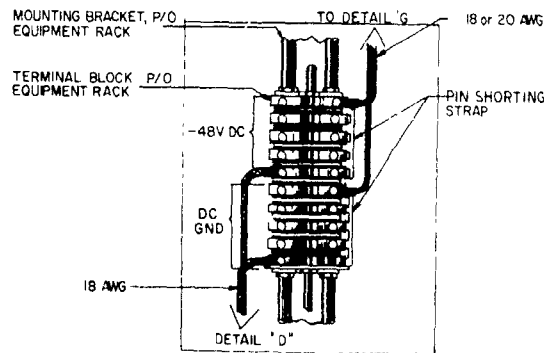
SHEET 4 OF 6

A

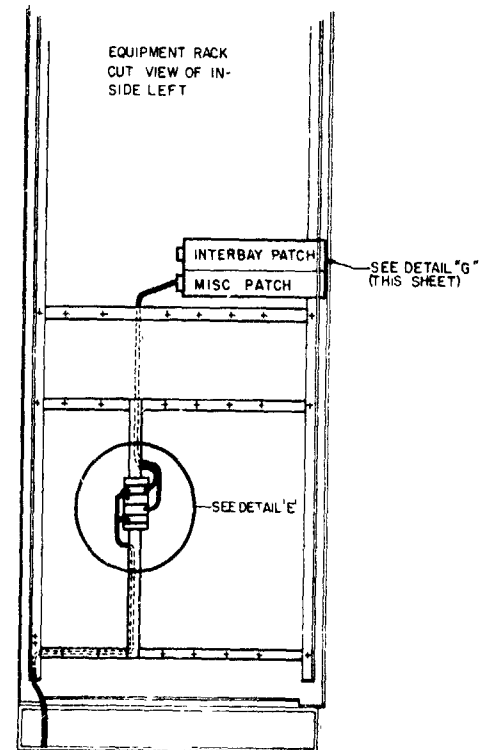


60 PIN CONNECTOR  
80 PIN CONNECTOR  
100 PIN CONNECTOR

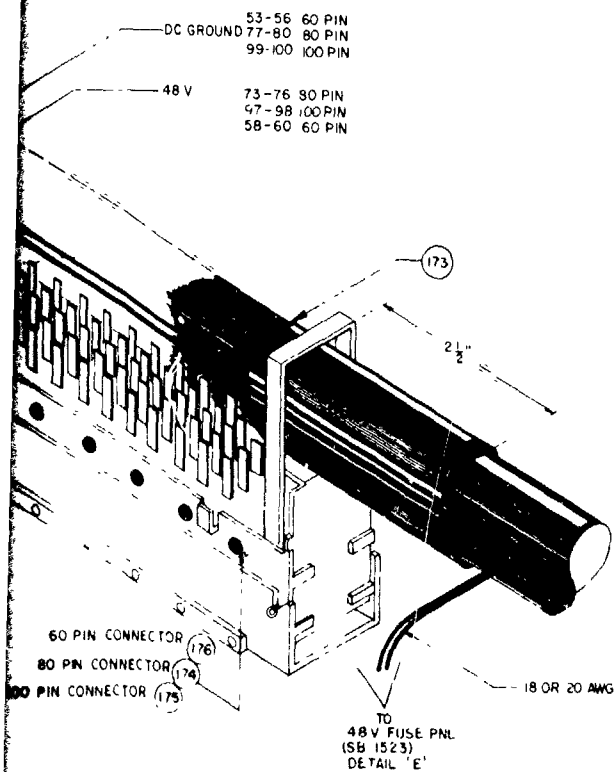
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		CHANGED TITLE AND SHEET, NUMBER CHANGED	9 NOV 76	



DC POWER  
TO EQUIPMENT RACKS  
DETAIL 'E'

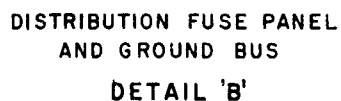


EQUIPMENT BAY  
INTERIOR VIEW, LEFT SIDE  
DETAIL 'F'

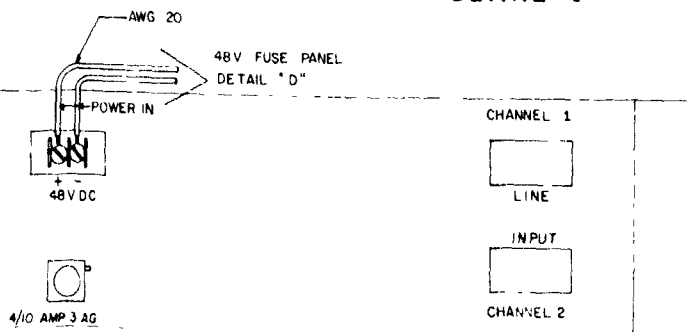
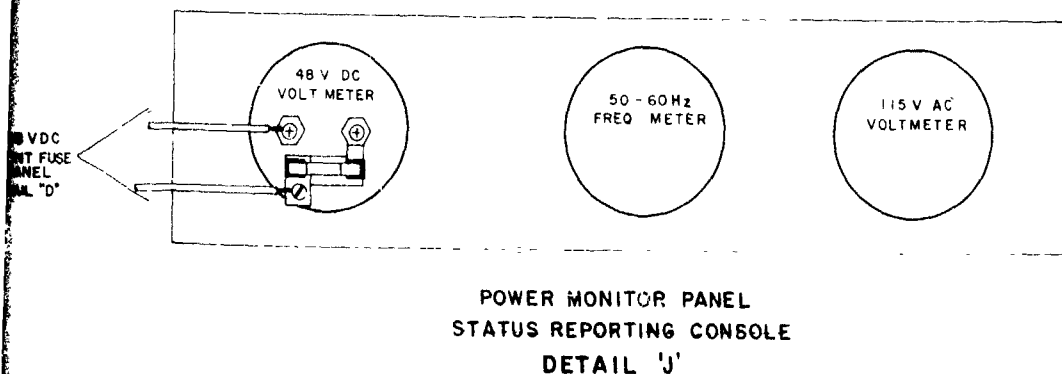
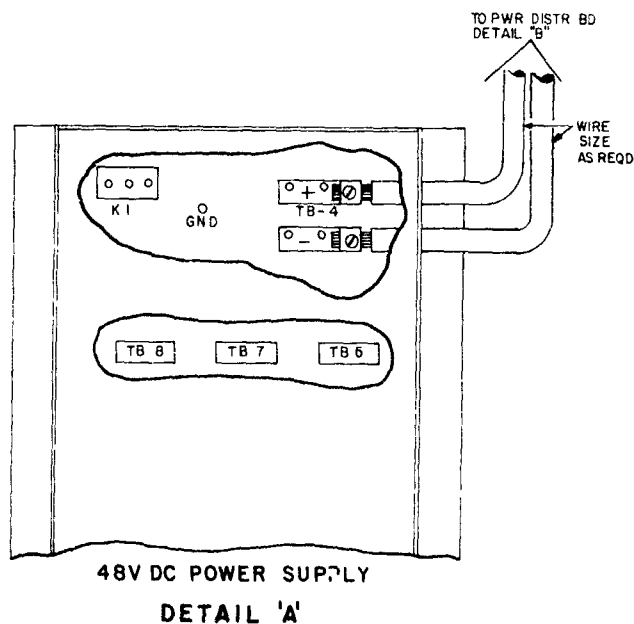


ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
		ORGANIZATION USACEEIA-CED PORT HANCOCK, ARIZONA		
DESIGN BY J RAMEY	48V DC POWER SYSTEM AND DISTRIBUTION			
DRAFTSMAN L A KAUFMAN				
CHECKER J [Signature]				
DATE 23 JAN 1976				
ORGANIZATION APPROVAL [Signature]		CODE IDENT NO. 50470	SIZE D	COM-TC03-115
APPROVAL		SCALE NONE	SHEET 5 OF 6	

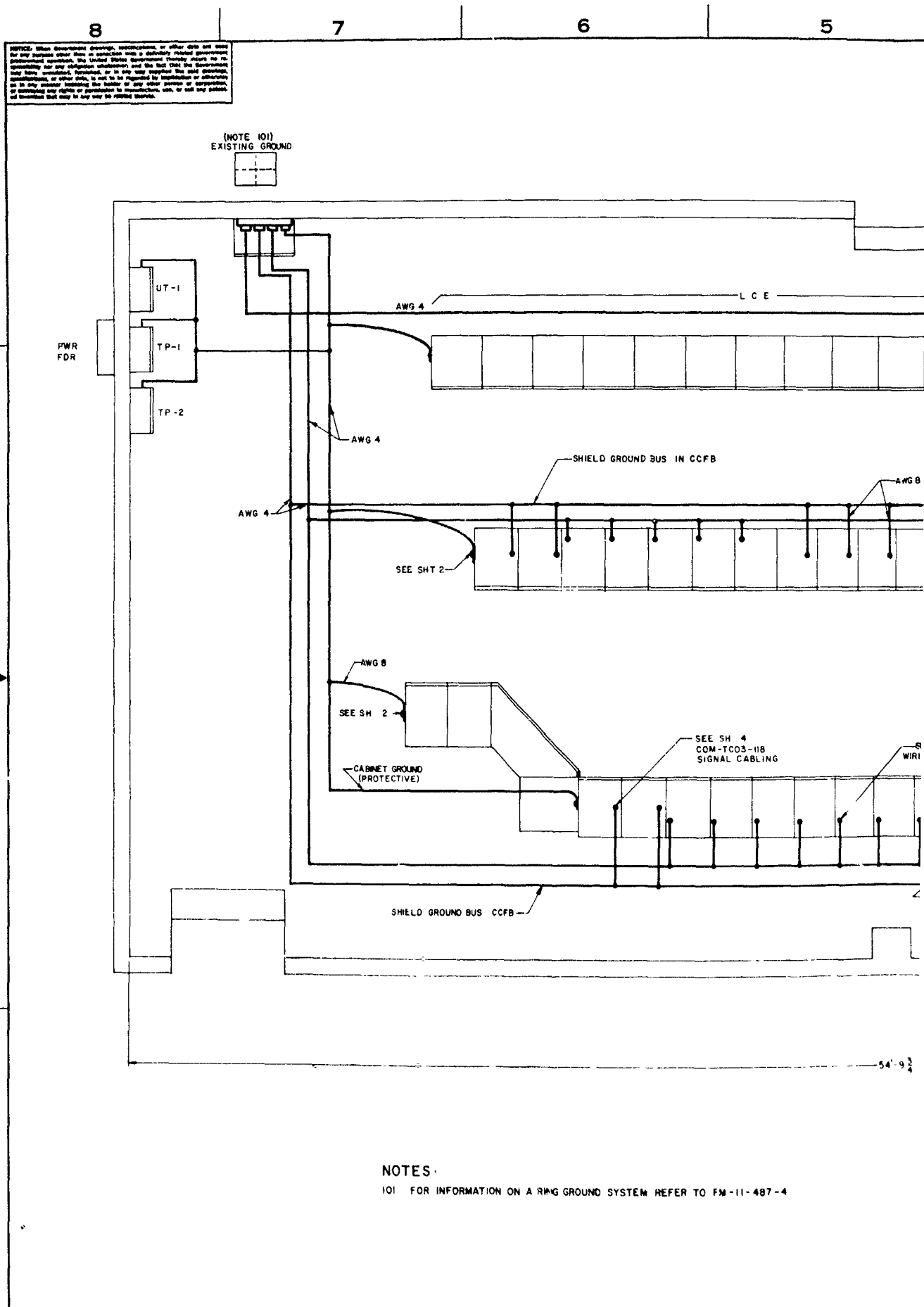
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REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
A		CHANGED TITLE AND SHEET NUMBER CHANGED	9 NOV 76



ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
DESIGN BY J RAMEY		ORGANIZATION USACEEIA-CED		
DRAFTSMAN L A KAUFMAN		PORT HUachuca, ARIZONA		
CHECKER A P. [Signature]		48V DC POWER SYSTEM AND DISTRIBUTION		
DATE 29 JAN 1976				
ORGANIZATION APPROVAL [Signature]		CODE REPORT NO. 50470	SIZE D	COM-TC03-115
APPROVAL		SCALE NONE	SHEET 6 OF 8	



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# NOTES

101 FOR INFORMATION ON A RING GROUND SYSTEM REFER TO FM-11-487-4

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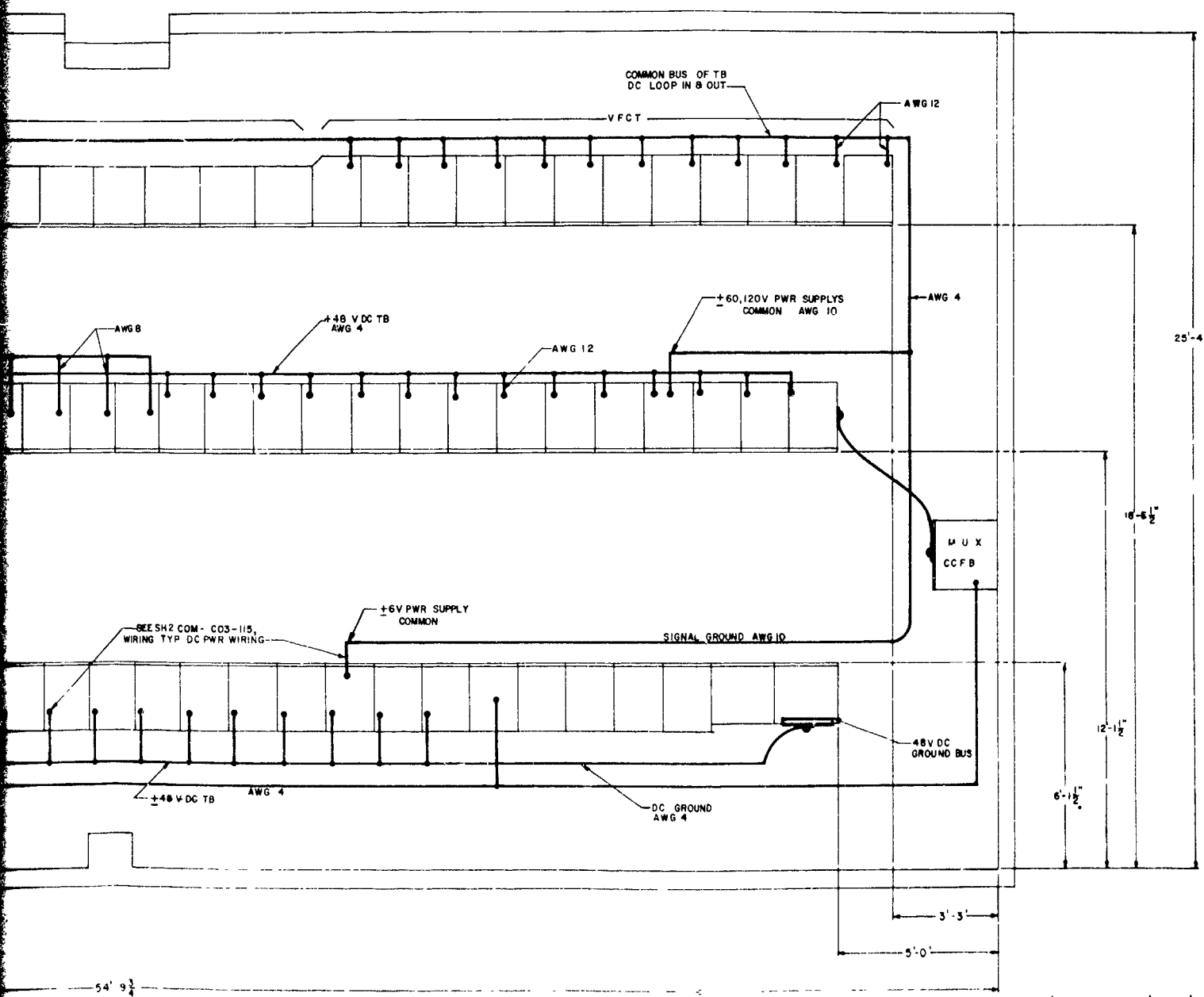
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REVI JWS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		ADDED NOTE 101	7 NOV 78	<i>[Signature]</i>



ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
		ORGANIZATION		
		USACEEIA-CED		
		FORT HUACHUCA, ARIZONA		
		TYPICAL GROUNDING SYSTEM		
		COM-TC03-116		
		SCALE NONE		
		SHEET 1 OF 2		

TC03-103	SEIP 006
NEXT ASSY	USED ON

DESIGN BY	J. RAMEY
DRAFTSMAN	L. KALFMAN
CHECKER	B. [Signature]
DATE	11 MARCH 1978
ORGANIZATION APPROVAL	
APPROVAL	

CODE IDENT NO.	50470	SIZE	D
SCALE	NONE	SHEET	1 OF 2

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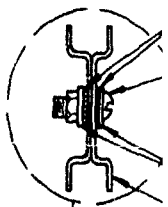
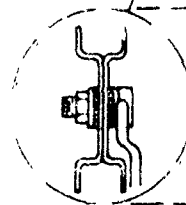
D

C

B

A

(NOTE 201)

EQUIPMENT  
RACKS

(NOTE 202)



5

4

3

2

1

REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
A		MINOR REVISIONS	7 NOV 76
		APPROVED	WBS

(NOTE 201)

EXTERNAL TOOTH LOCK WASHER

3/8-16 X 3/4" SLOTTED RH STOVE BOLT W/NUT

3/8" FLAT WASHER

SIDE STRUTS OF EQUIPMENT RACKS

## NOTES

201 THIS DETAIL IS APPLICABLE TWO PLACES ALL EQUIPMENT RACKS EXCEPT AS SHOWN IN DETAIL BELOW

202 THIS DETAIL IS APPLICABLE AT ONE END OF EACH ROW

203 GREEN CABINET GROUND WIRE (SIZE TO BE SPECIFIED) TO CABINET GROUND BUS

(NOTE 203)

(NOTE 202)

DESCRIPTION

F SN

UI

QTY

## LIST OF MATERIALS

ORGANIZATION

USACEEIA-CED

FORT HAVEN, ARIZONA

TYPICAL  
GROUNDING SYSTEM

CODE IDENT NO

50470

DATE

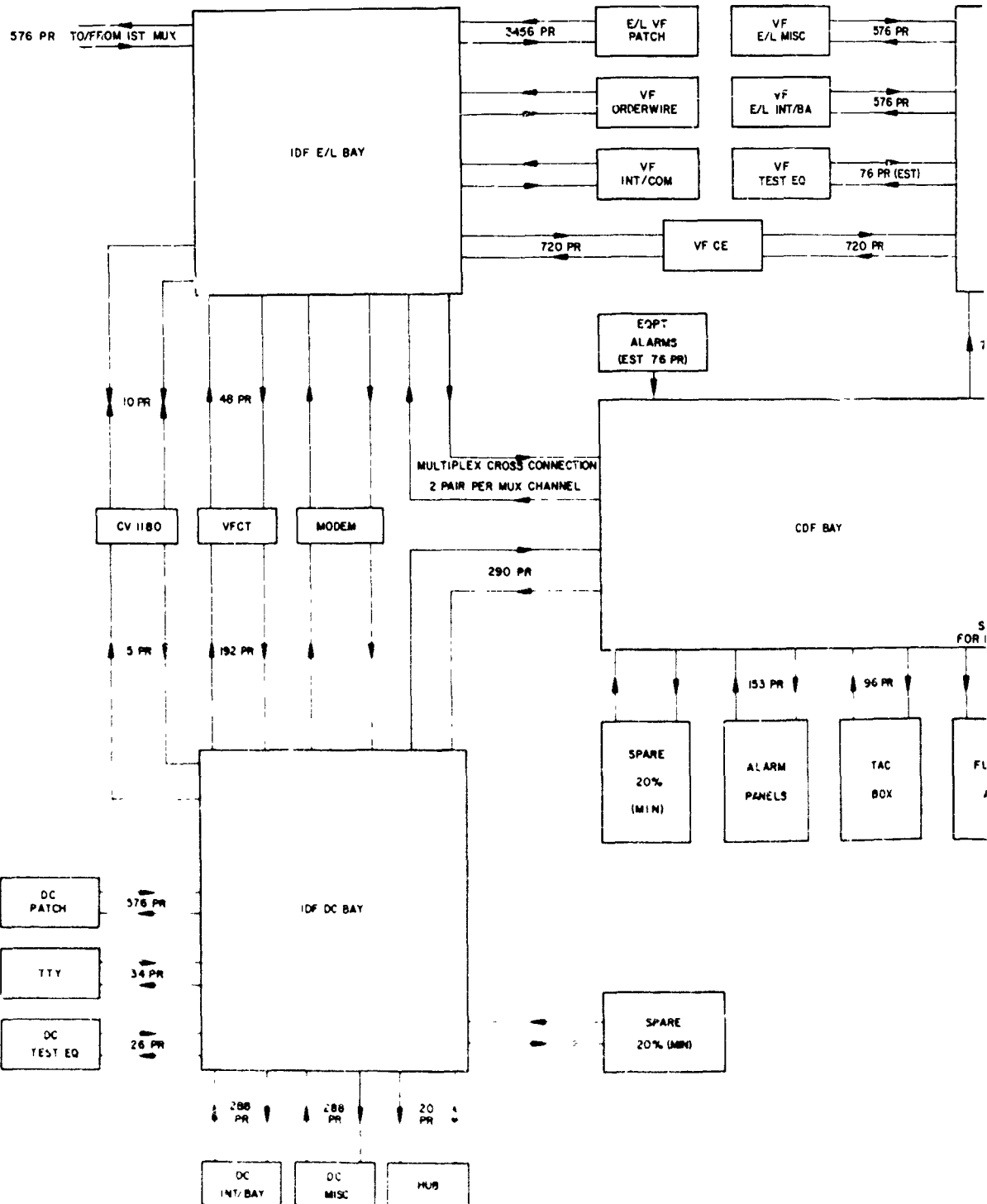
D

COM-TC03-116

SCALE NONE

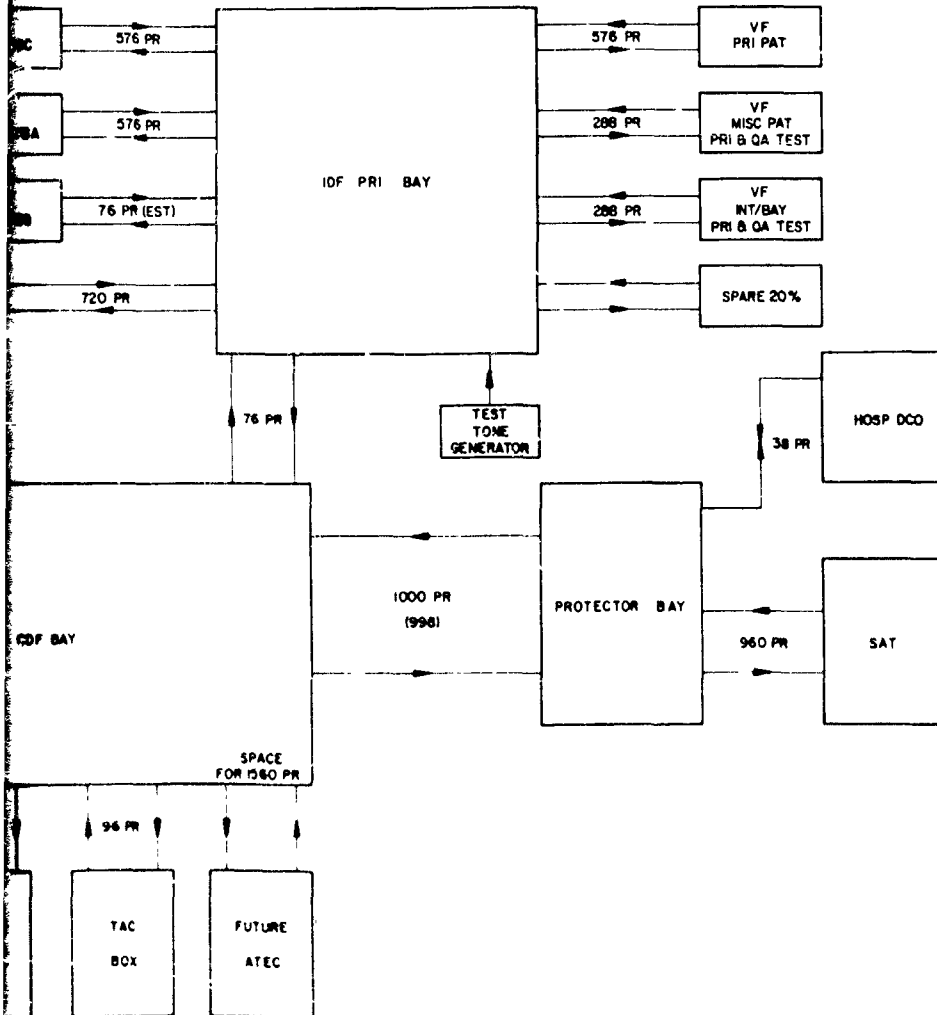
PAGE 2 OF 2

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TYPICAL TCF CABLING REQUIREMENTS

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN THIS SH'T ADDED	6 NOV 78	gal



ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE ROUTING DIAGRAM					
DRAWING NO. COM-TC03-117					
SHEET 1 OF 3					

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE ROUTING DIAGRAM					
DRAWING NO. COM-TC03-117					
SHEET 1 OF 3					

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE ROUTING DIAGRAM					
DRAWING NO. COM-TC03-117					
SHEET 1 OF 3					

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE ROUTING DIAGRAM					
DRAWING NO. COM-TC03-117					
SHEET 1 OF 3					

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE ROUTING DIAGRAM					
DRAWING NO. COM-TC03-117					
SHEET 1 OF 3					

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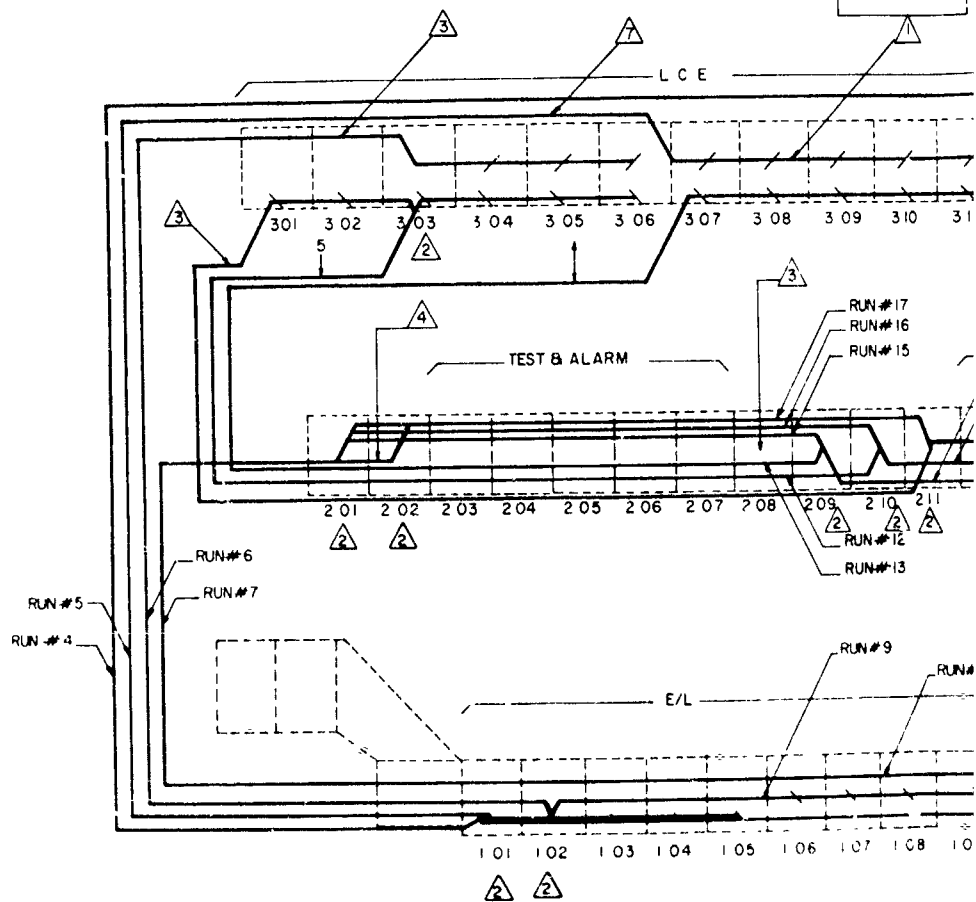
D  
C  
B  
A

e

7

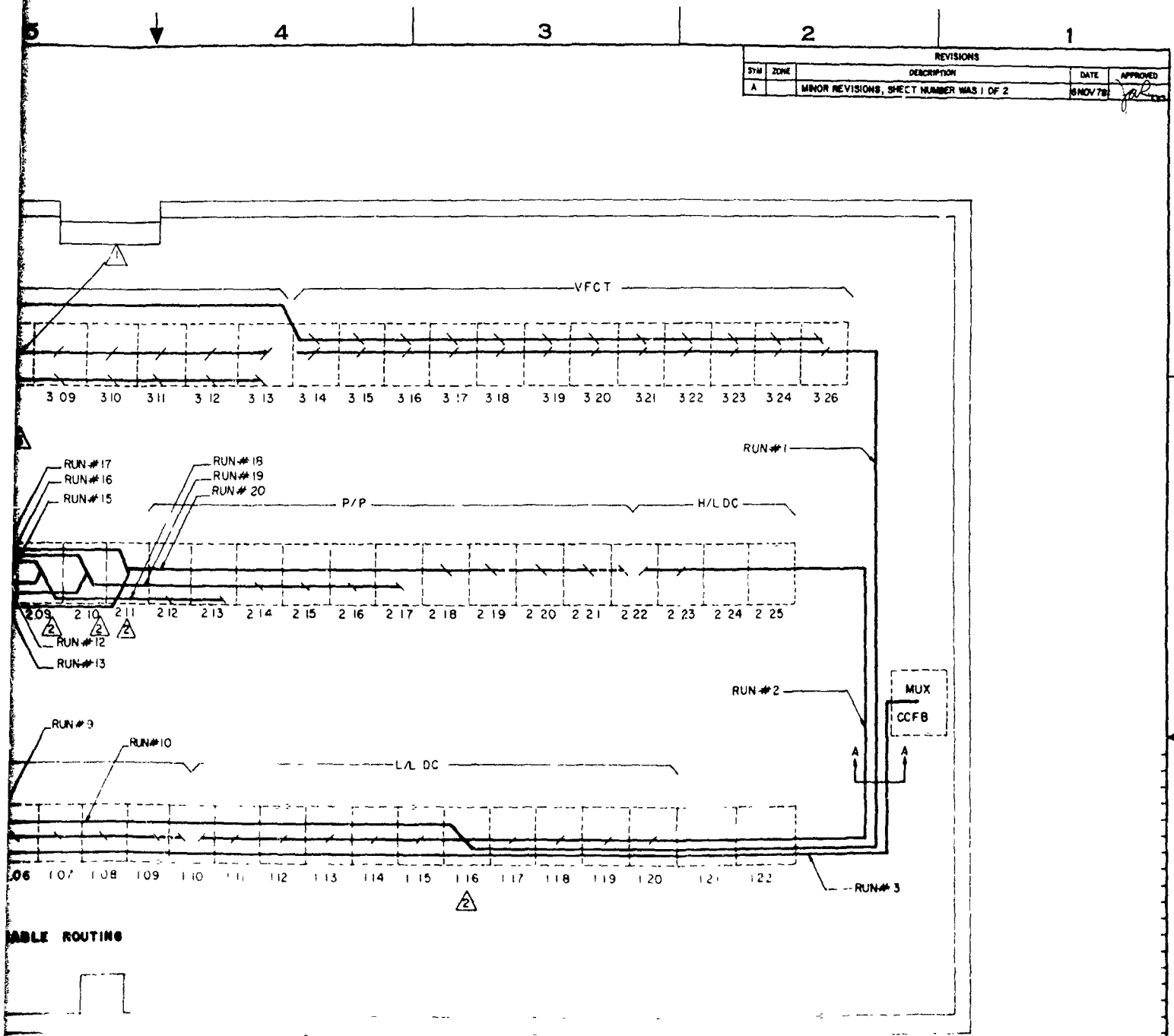
6

5



CABLE ROUTING

- 1 INDICATES CABLES TERMINATE IN THE
- 2 CIRCUIT CONCENTRATION FRAME BAY (CCF)
- 3 CABLE ALL MISCELLANEOUS, INTERBAY,
- 4 TIE CABLE FROM SUBSIDIARY TO PRIMARY
- 5 SEE DRAWING NO. COM 10.1.104 SHEET
- 6 SEE DRAWING NO. COM 10.1.104 SHEET
- 7 SEE DRAWING NO. COM 10.1.104 SHEET
- 8 SEE DRAWING NO. COM 10.1.104 SHEET



**CABLE ROUTING**

- IS TERMINATE IN THAT BAY
- NATION FRAME BAY (CCFB)
- ELLANEUS, INTERBAY, ALARM, & TEST CABLES TO THIS BAY
- DISCONNECT TO PRIMARY BAY LATCH
- COM-TC03-104 SHEET FOR LAYOUT
- COM-TC03-2 FOR TYPICAL CABLE RACK LAYOUT
- COM-TC03-18 SIGNAL TERMINATING DETAILS
- COM-TC03-19 INTERBAY & MISCELLANEOUS PANELS WIRING DETAILS

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS, SHEET NUMBER WAS 1 OF 2	8 NOV 78	<i>[Signature]</i>

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
ORGANIZATION USACECIA-CED FORT RANCHO, ARIZONA				
DESIGN BY: NAME				
DRAFTSMAN: NAME				
CHECKER: NAME				
DATE: DATE				
ORGANIZATION APPROVAL				
TC 03-104		JE MOORE		
NEXT ASSIGNED		DATE		
APPROVAL		APPROVAL		
CODE IDENT NO.		50470	D	COM-TC03-117
SCALE		NONE	SHEET 2 OF 3	

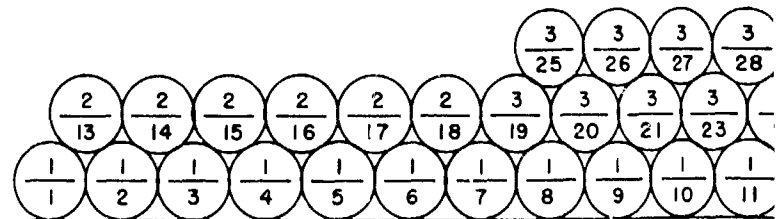
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D

C

B

A



SECTION "A-A"  
TYPICAL CROSS SECTION

5

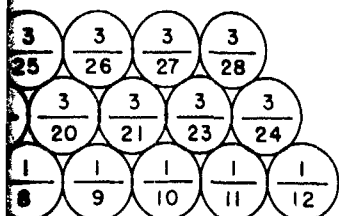
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3

2

1

REVISIONS				
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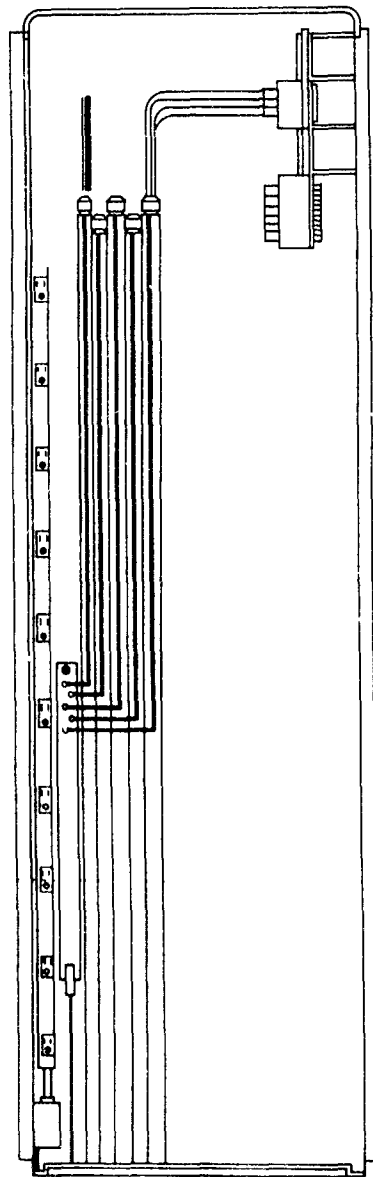


RUN # INDICATES RUN SEQUENCE NUMBER  
 CABLE # INDICATES ASSIGNED CABLE NUMBER

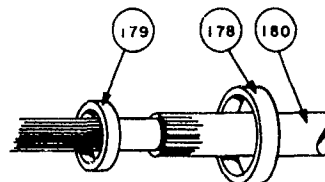
SECTION

ITEM	DESCRIPTION	FSN	UI	QT
LIST OF MATERIALS				
DESIGN BY J RAMEY		ORGANIZATION USACEEIA-CED PORT HANCOCK, ALABAMA		
DRAFTSMAN R PLOEGER		SIGNAL CABLE		
CHECKER <i>[Signature]</i>		ROUTING DIAGRAM		
DATE 12 MARCH 1976				
ORGANIZATION APPROVAL <i>[Signature]</i>		CODE IDENT NO 50470	SIZE D	COM-TC03-117
APPROVAL		SCALE NONE	SHEET 3 OF 3	

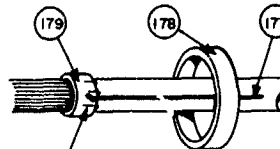
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TYPICAL CCFB CUTAWAY VIEW



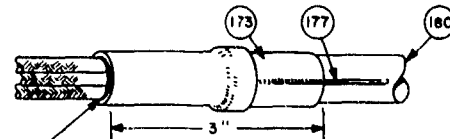
STEP 1 DRAIN WIRES HAIRPINNED BACK ON OUTER INSULATION OF 76 PR SHIELDED CABLE



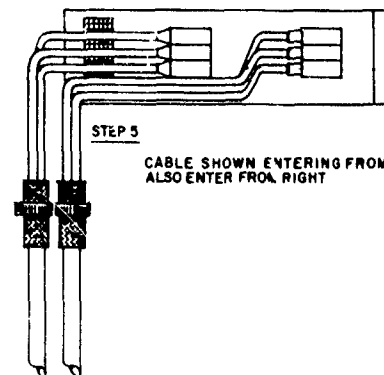
STEP 2 76 PR CABLE DRAIN WIRES ARE TO BE FOLDED OVER INNER CONNECTOR. A SINGLE 14 GA SOLID DRAIN WIRE LEADING TO THE SHIELD GROUND BUSS IS TO BE HAIRPINNED AND PLACED INTO POSITION BEFORE THE OUTER COMPRESSION RING IS CRIMPED INTO POSITION.



STEP 3 DIVIDE 76 PR CABLE INTO 3 GPs 25 PR EACH THEN INSTALL SHRINKABLE TUBING ON EACH GP FROM BUTT TO CONNECTORS

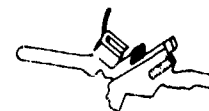
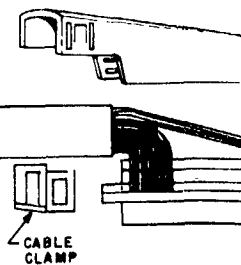
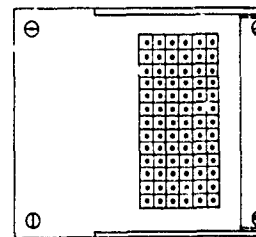
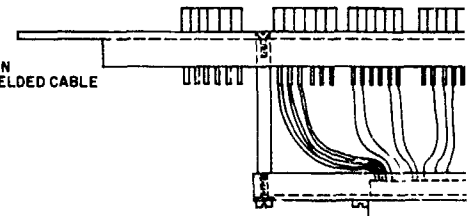


STEP 4 AFTER THE BUTTING CONNECTION HAS BEEN MADE A DISTANCE OF APPROXIMATELY THREE INCHES LONG IS TO BE COVERED WITH BLACK SHRINKABLE TUBING



STEP 5 CABLE SHOWN ENTERING FROM LEFT. CABLE MAY ALSO ENTER FROM RIGHT

TYPICAL CCFB WIRING INFORMATION

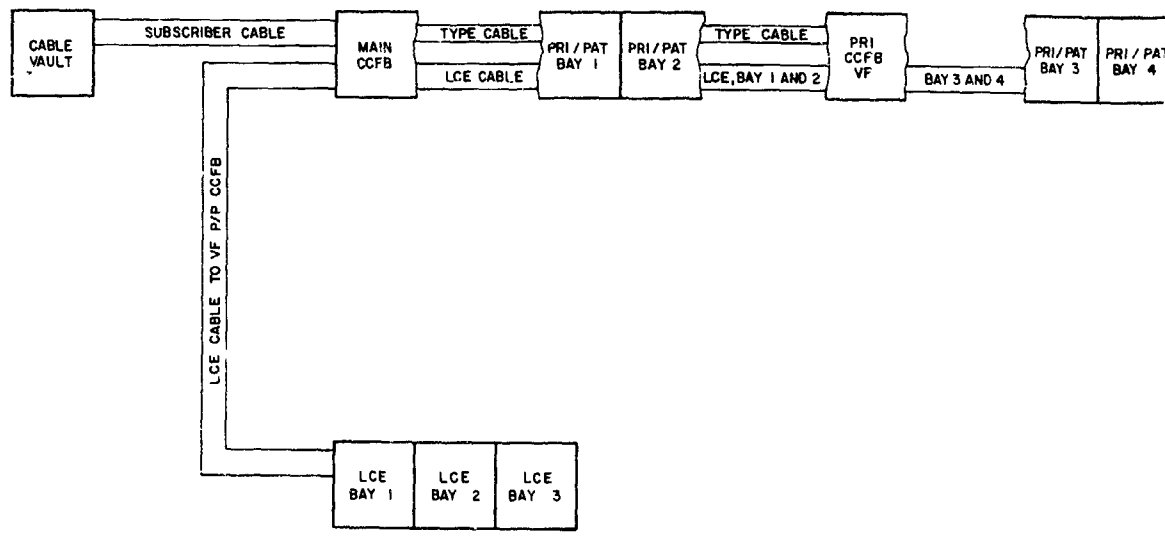


PORTABLE HAND OPERATE CABLE CONNECTOR TERMIN. AMPHENOL NO 229378-5 (15)

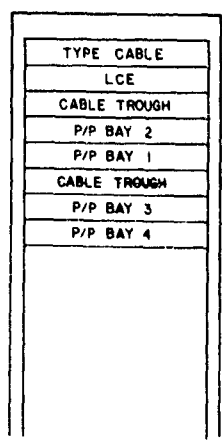




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TYPICAL CCFB PLACEMENT AND CABLING



CCFB UNDERFLOOR CABLE ELEVATION

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN SMT NO CHNG	1 NOV 78	

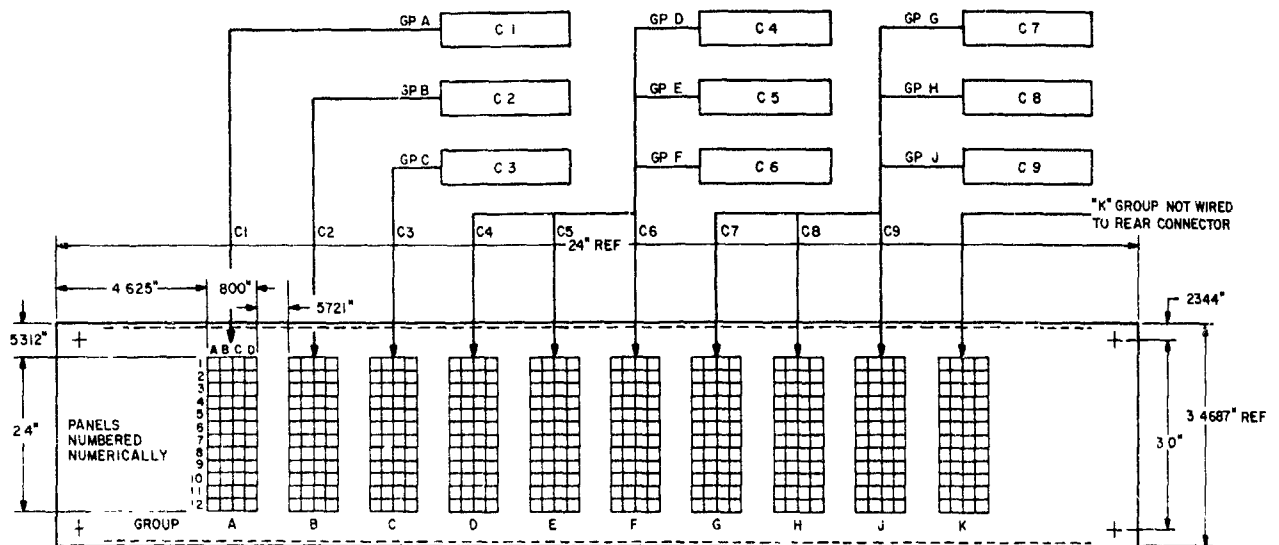
SAND 4	PRI / PAT BAY 3	PRI / PAT BAY 4

# NOTES:

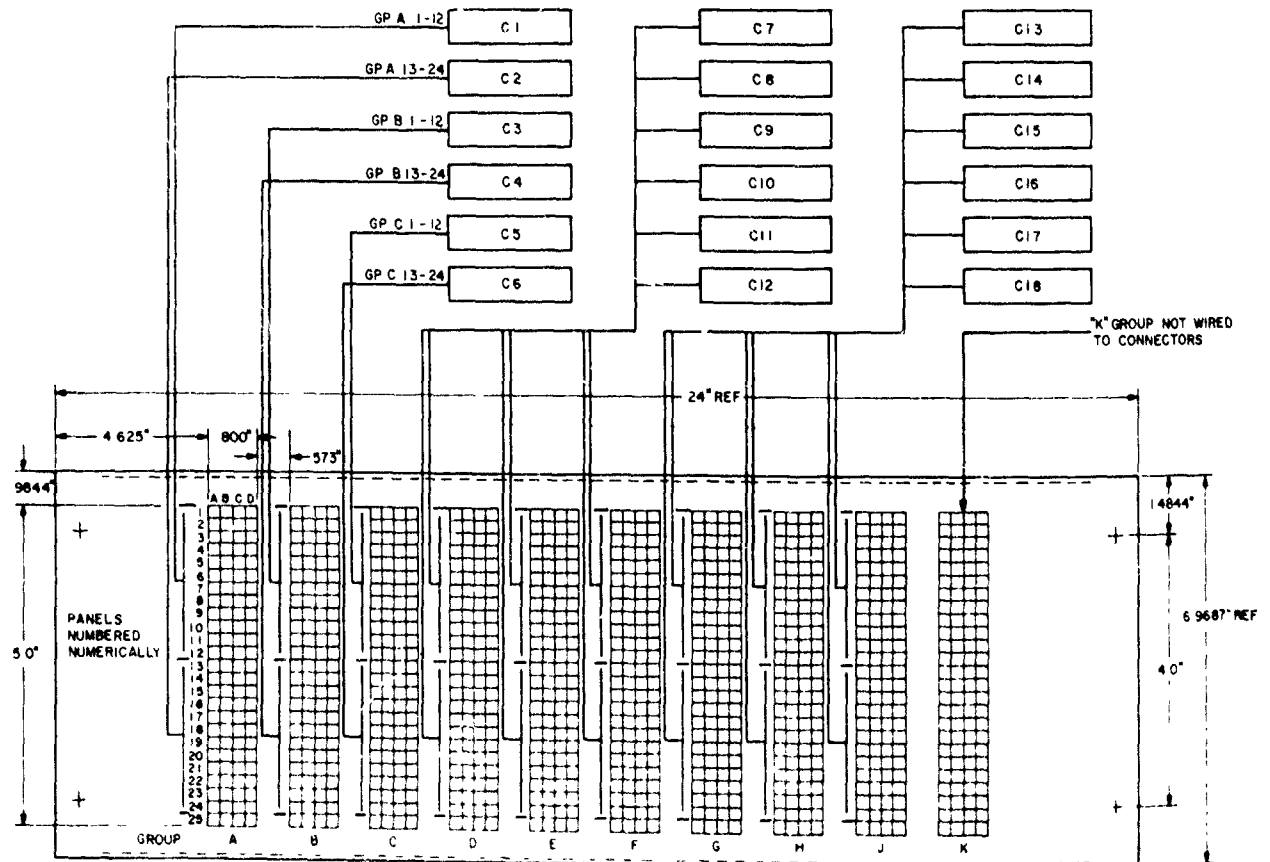
- 201 PLACE THE CCFB FOR SHORTEST CABLE RUNS
- 202 UNDERFLOOR CABLE SYSTEM
  - a FIRST RUN SHOULD BE FROM FURTHER MOST BAY
  - b CABLE NOT TO BE LACED UNTIL LAST CABLE IS RUN FROM THAT DIRECTION
  - c CABLE FROM THE CLOSEST BAY WILL TERMINATE ON THE TOP MOST CCFP
- 203 OVERHEAD CABLE SYSTEM
  - a FIRST CABLE RUN WILL BE FROM CLOSEST BAY
  - b CABLE CAN BE LACED AS RUN.
  - c CABLE FROM CLOSEST BAY WILL TERMINATE ON THE BOTTOM MOST CCFP

ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
IDENT NO		ORGANIZATION U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY			
DESIGNED BY	DATE	SIGNAL CABLE TERMINATING DETAILS			
DRAWN BY	DATE				
CHECKED BY	DATE				
APPROVED BY	DATE				
NEXT ASSEMBLY	USED ON	DESIGN ACTIVITY CCC-CED-XET	SIZE/PSCH NO D 50470	DRAWING NO COM-TC03-118	SCALE NONE
DWG INDEX NO:					

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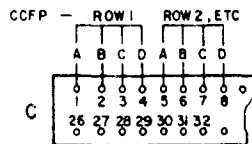
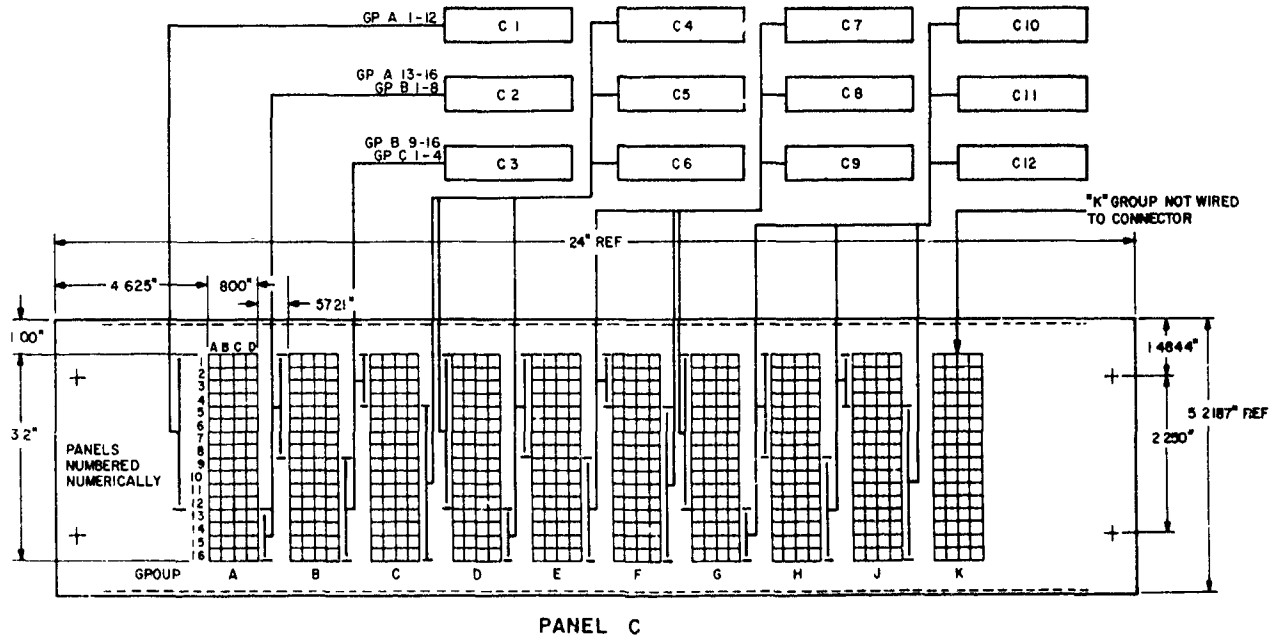


PANEL A



PANEL B

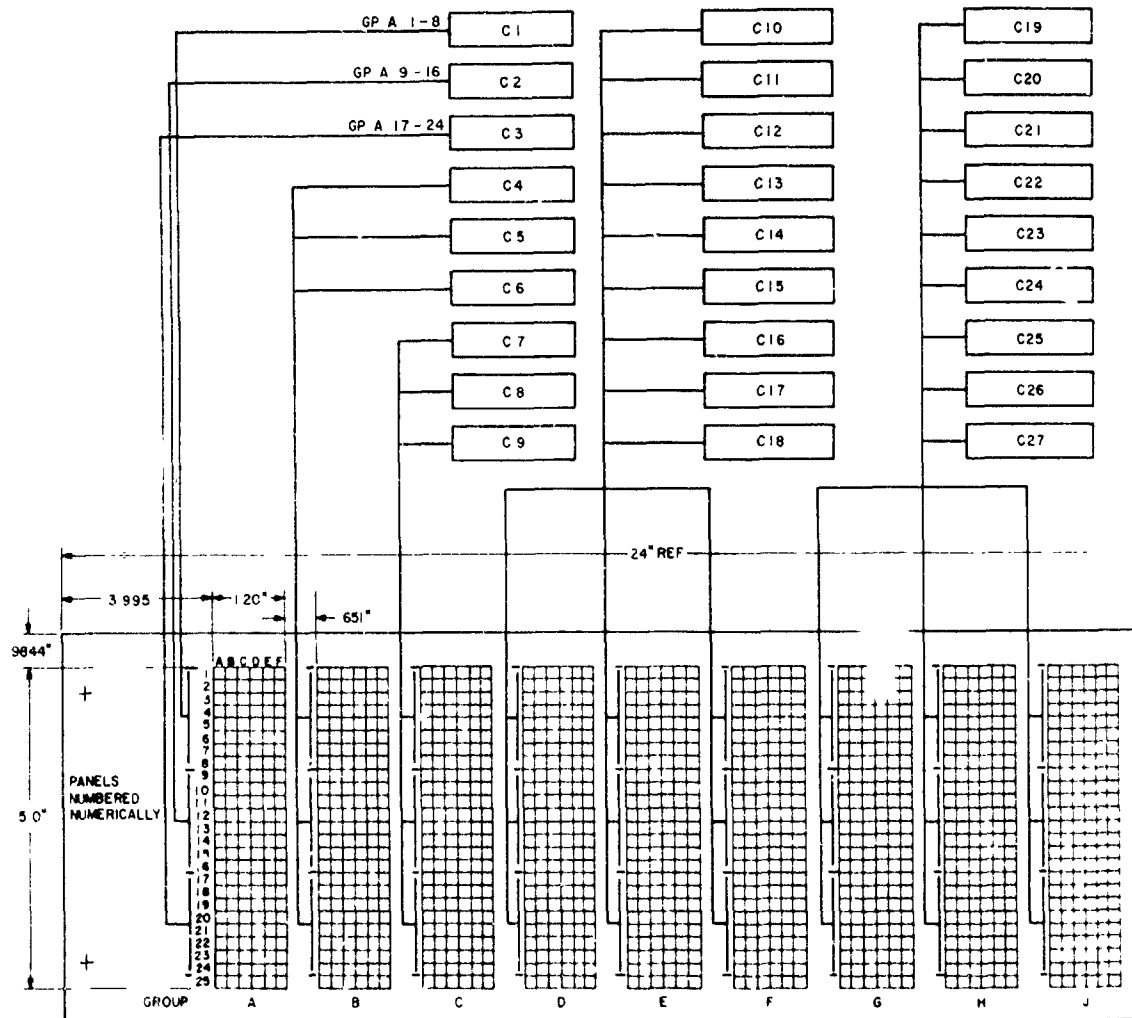
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN SHT NO CHANGED	1 NOV 78	<i>[Signature]</i>



CONNECTOR TO PIN GROUP WIRING  
PANEL A, B AND C

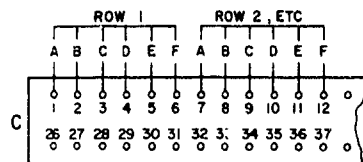
ITEM	AEL	DESCRIPTION	QTY	UI	QTY
LIST OF MATERIALS					
IDENT NO					
ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
DESIGNED BY NAMEY DATE 2 OCT 78					
DRAWN BY M. BOLLACK 2 NOV 78					
CHECKED BY [Signature] 12 NOV 78					
APPROVED BY [Signature] 12 NOV 78					
DESIGN ACTIVITY					
UCC-CED-XET					
NEXT ASSEMBLY USED ON					
DWG INDEX NO					
SIZE/FSCB NO D 50470					
DRAWING NO COM-TC03-118					
SCALE NONE					
SHEET 3 OF 13					

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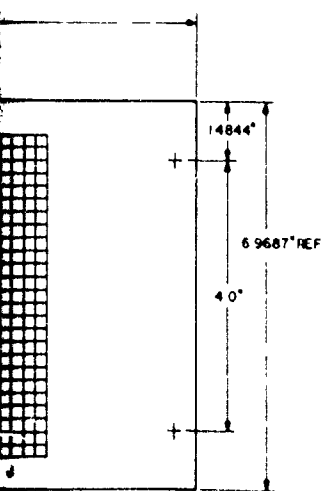


PANEL D

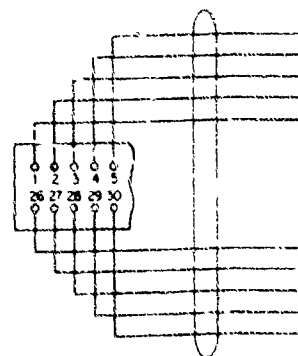
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN SMT NO CHANGED	1 NOV 78	<i>[Signature]</i>



CONNECTOR TO PIN GROUP WIRING  
PANEL D



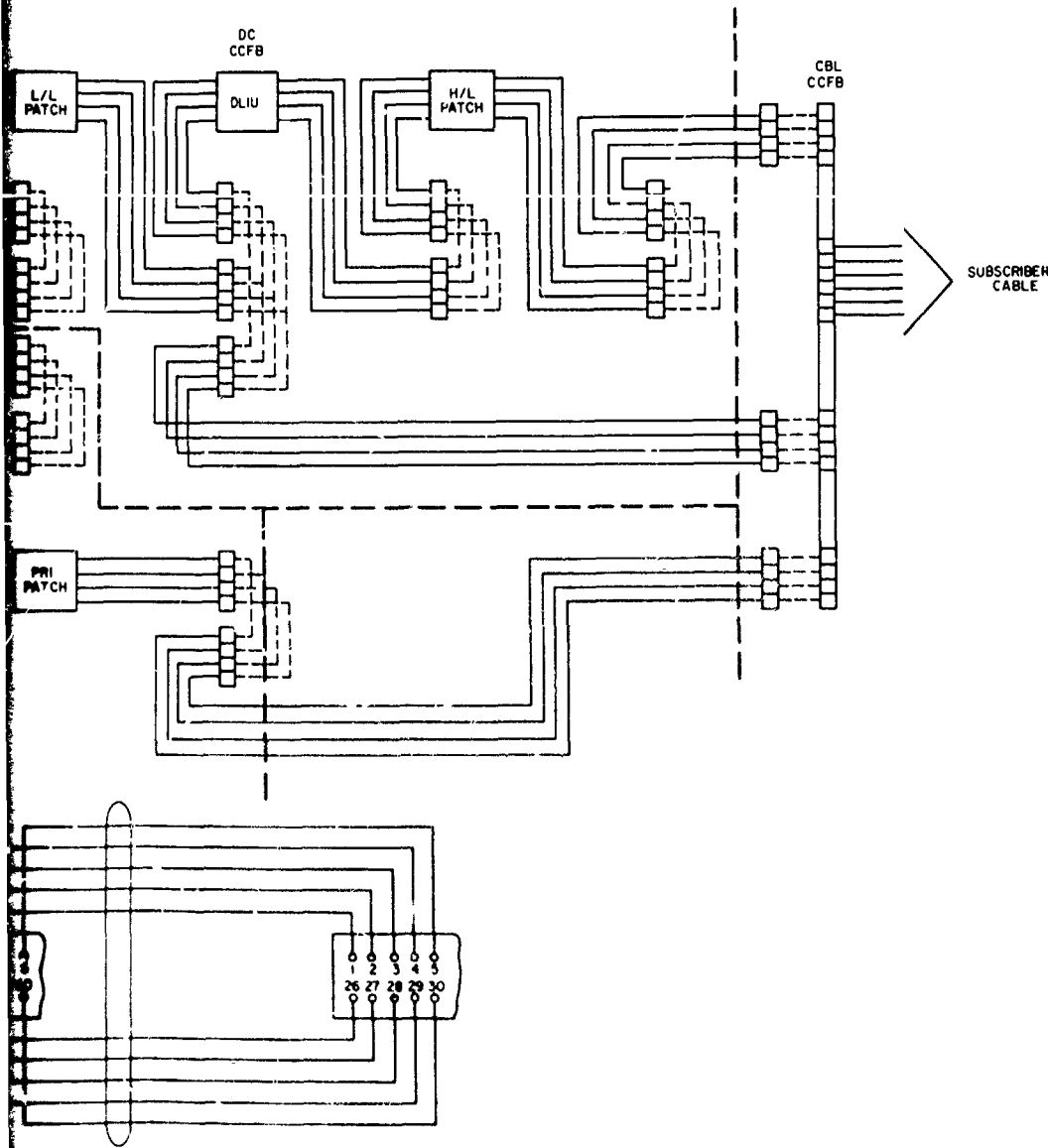
ITEM	AEL	DESCRIPTION	MSN	UI	QTY		
LIST OF MATERIALS							
DENT NO		ORGANIZATION U S ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
DESIGNED BY KAMLET		DATE NOV 78		SIGNAL CABLE TERMINATING DETAILS			
DRAWN BY U S ARMY		DATE NOV 78					
CHECKED BY [Signature]		DATE NOV 78					
NEXT ASSEMBLY		USED ON		DRAWING NO COM-TC03-118			
DWS INDEX NO		CULLED SET		SHEET 4 OF 13			



AUDIO PATCH PANEL CCC 75047  
MISCELLANEOUS PATCH PANEL CC  
INTERBANK PATCH PANEL CCC 750  
48 LAMP DC INTERBANK PATCH PANEL  
L/A DC PATCH PANEL CCC-75054  
H/L V/F PATCH PANEL CCC-75080  
E/B M/F S/PMS PATCH PANEL CC  
ALARM DISPLAY PANEL CLC 7500



REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN SMT NO CHANGED	1 NOV 70	<i>[Signature]</i>



WIRING FOR CABLES BETWEEN CCFB CCC 75068 D THE FOLLOWING

- PATCH PANEL CCC 75047
- LANE/CUS PATCH PANEL CCC 75049
- DATA PATCH PANEL CCC 75048
- DC INTERFAY PATCH PANEL CCC 75052
- PATCH PANEL CCC 75058
- PATCH PANEL CCC 75059
- ESC/PMH PATCH PANEL CCC 75063
- DISPLAY PANEL CCC 75061

ITEM	AEL	DESCRIPTION	NSN	QI	QTY
LIST OF MATERIALS					
IDENT NO		ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AP'N'CY			
DESIGNED BY J. RAMEY		DATE 1 OCT 70			
DRAWN BY S. RABUT		DATE 6 NOV 70			
CHECKED BY		DATE			
APPROVED BY		DATE			
NEXT ASSEMBLY		USED ON		SIGNAL CABLE TERMINATING DETAILS	
CCC-CEC-XET		SIZE 50470		DRAWING NO COM-TC03-118	
DWS INDEX NO		SCALE		SHEET 5 OF 3	

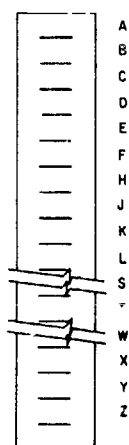
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# SHELF CONNECTOR, DLIU SHELF

# TB IN TEST BAY

J2

SHELF CONNECTOR



ROW	PR	USE	PIN
1	1	A-IN	1,2
1	2	A-OUT	3,4
1	3	B-IN	5,6
1	4	B-OUT	7,8

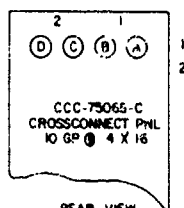
REPEAT J4  
(NOTES 601 AND 602)

51 PR (2 SHELF)  
76 PR (3 SHELF)

BOTTOM VIEW	
18	9
17	8
16	7
15	6
14	5
13	4
12	3
20	11
19	10

OUT IN

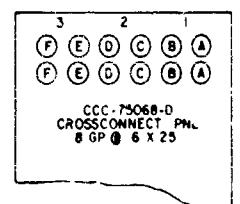
X PIN GP CONNECTOR



REAR VIEW

ROW	PR	USE	PIN
1	1	A-IN	1,2
1	2	A-OUT	3,4
2	3	B-IN	5,6
2	4	B-OUT	7,8

ETC

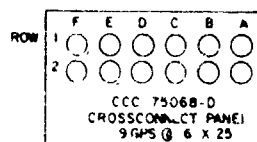


REAR VIEW

# DLIU SHELF CABLE TERMINATION

# TEST BAY T/B CABLE

OUT	SIG	IN	REC	EQ	SND	REC	LINE	SND
10		9	8	7	6	5	4	3
							2	1



ROW 1  
A B C D E F  
ROW 2  
A B C D E F

1	2	3	4	5	6
26	27	28	29	30	31

CONNECTOR

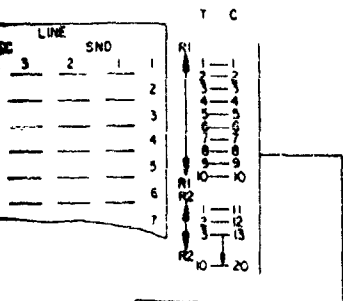
TEST BAY

VIEW	
18	9
17	8
16	7
15	6
14	5
13	4
12	3
11	2
10	1

1	A
2	B
3	C
4	D
5	E
6	F
7	G
8	H
9	I
10	J
11	K
12	L
13	M
14	N
15	O
16	P
17	Q
18	R
19	S
20	T
21	U
22	V
23	W
24	X
25	Y
26	Z

VIEW

TEST BAY T/B CABLE TERMINATION



2	3	4	5	6	7	8	9	10
27	28	29	30	31	32			

CONNECTOR

TB CONNECTOR

PR	FOR	PIN
1	T,R	1,2
2		3,4
3		5,6
4		7,8
5		9,10
6		11,12
7	T,R	13,14

5 OR 76 PR CABLE

X PIN GP CONNECTOR

ROW	PR	FOR	PIN
1	1	T,R	1,2
1	2		3,4
1	3		5,6
2	4		7,8
2	5		9,10
2	6		11,12
3	7	T,R	13,14

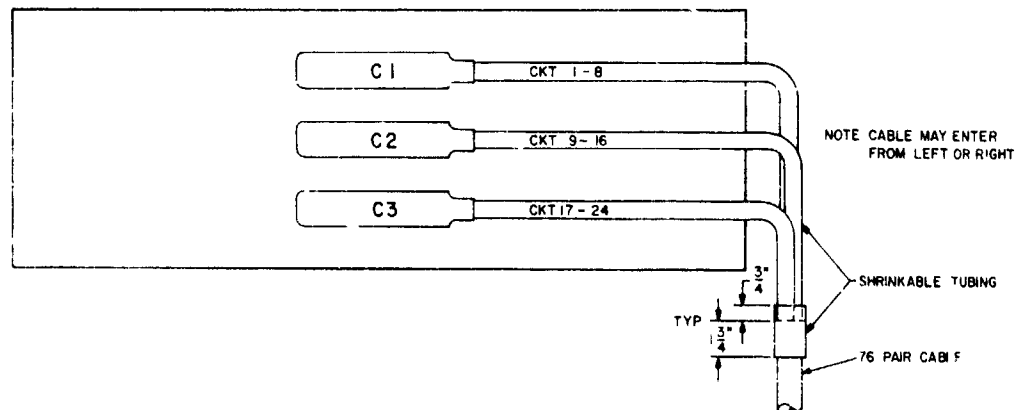
NOTES-

- 601 PIN K NT/OL CONNECTS TO ALARM PANEL
- PIN L FUSE ALARM CONNECTS TO ALARM PANEL
- PIN S,T JUMPERS TO ALL S,T AND CONNECTS TO -60, +60 V DC.
- PIN W JUMPERS TO ALL W AND CONNECT TO GROUND.
- PIN X JUMPERS TO ALL X AND CONNECT TO +150 V DC.
- PIN Y,Z JUMPERS TO ALL Y,Z AND CONNECT TO 115 V AC.
- 602 IF STANDARD UNIVERSAL SHELF IS USED WIRE EVEN CONNECTORS ONLY J2,4,6,8,10,12

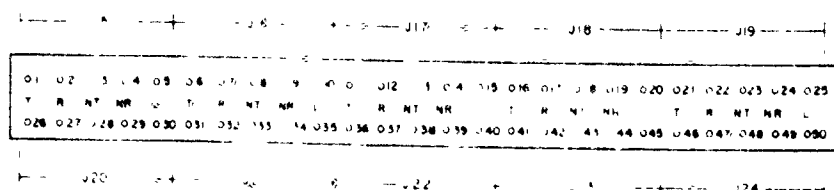
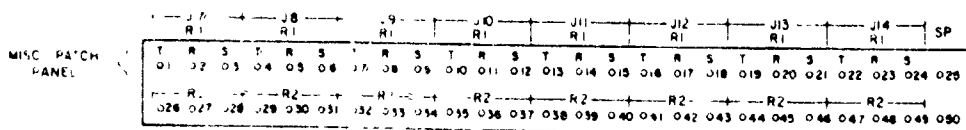
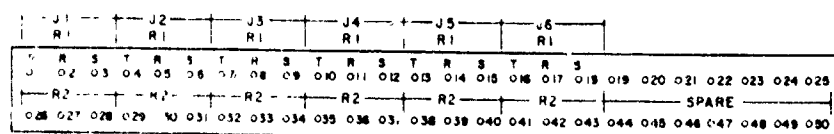
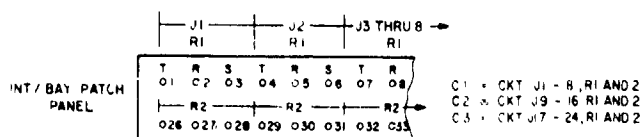
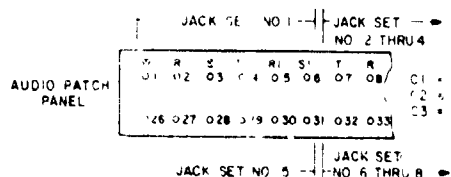
REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
A		THIS DWG SUPERSEDES COM-TC03-118 DATED 21 APR 78 SHT 4 OF 8 REVISED AND REDRAWN SHT NO CHANGED	1 NOV 78

ITEM	AEL	DESCRIPTION	NSN	U	QTY
LIST OF MATERIALS					
ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE TERMINATING DETAILS					
DESIGNED BY J. HAMEY DATE 2 DEC 77					
DRAWN BY J. HAMEY DATE 1 NOV 78					
CHECKED BY J. HAMEY DATE 1 NOV 78					
APPROVED BY J. HAMEY DATE 1 NOV 78					
NEXT ASSEMBLY USED ON CCC-CED-XET					
DWG INDEX NO					
SIZE PGW NO 50470 DRAWING NO COM-TC03-118					
SCALE NONE SHEET 6 OF 13					

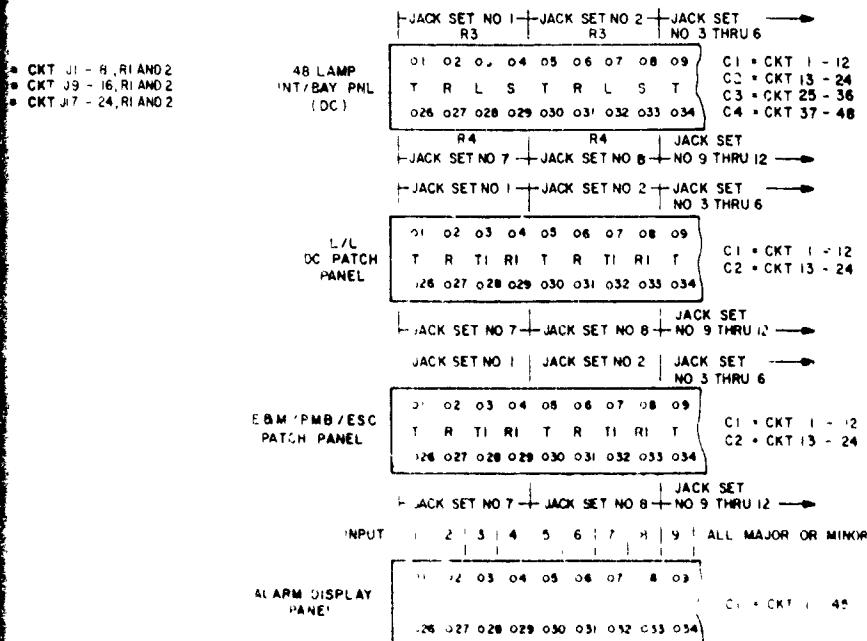
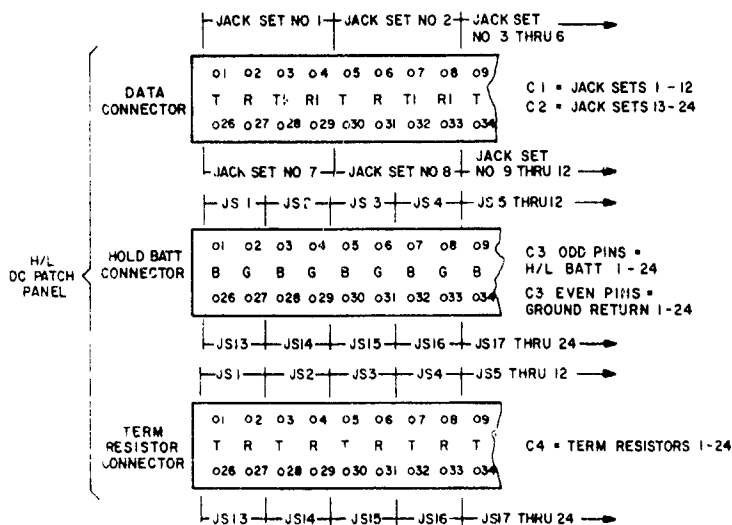
NOTES: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government hereby disclaims any responsibility for any obligation whatsoever, and the fact that the Government and Army, Navy, or Air Force, or in any way provided the said drawings, specifications, or other data, is not to be regarded as implication or otherwise in any manner (including the holder or any other person or corporation, or accepting any claim or protection in connection therewith, or in any patent or invention that may in any way be related thereto).



TYPICAL PATCH PANEL INSTALLATION



REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN SHT NO CHANGED	1 NOV 70	



ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
IDENT. NO.		ORGANIZATION U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY			
DESIGNED BY		DATE			
DRAWN BY		DATE			
CHECKED BY		DATE			
APPROVED BY		DATE			
TITLE		SIGNAL CABLE TERMINATING DETAILS			
NEXT ASSEMBLY		REF. NO.		DRAWING NO.	
DWG. INDEX NO.		D 50470		COM-TC03-118	
SCALE		NONE		SHEET 1 OF 13	

### TYPICAL WIRING FOR 16 CHANNEL DUPLEX OPERATION

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS SHEET NUMBER WAS 6 OF 8	1 NOV 78	<i>[Signature]</i> ED

## VF COMPOSITE SIGNALS

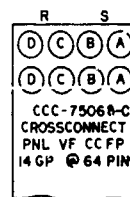
TERMINAL BLOCK 1TB2

PIN	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
PIN	1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137	145	153
ROW	1	4	7	10	13	16	19	22	25	28	31	34	37	40	43	46	49	52	55	58

AN/FCC-67 (VFCT)      COMPOSITE SIGNALS  
(IN) (OUT)

[illegible]

## AN / FCC - 67 (VFCT)



## REAR VIEW

[illegible]

VF CIRCUIT CONCENTRATION FRAME BAY  
CCC-75067

## AN/FCC-67 TYPICAL WIRING FOR VF COMPOSITE LINES

## NOTES:

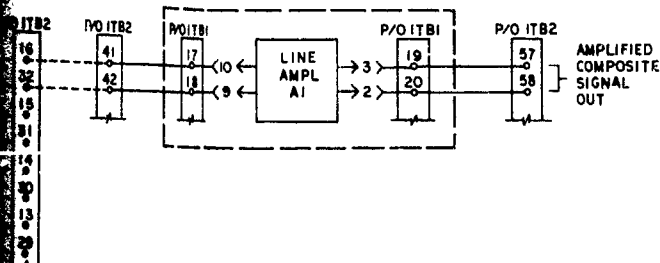
- 1 FOR MORE DETAIL INFORMATION SEE TM11-5805-496-15 TECHNICAL MANUAL FOR TELEGRAPHY TERMINAL AN/FCC-67
- 2 IF EXTERNAL BATTERY IS REQUIRED STRAP PINS 97-105, 98, 106, 99, 107, 100, 108, 101-109, 102-112, 103-111, 104-112, 129-137, 130, 138, 131-135, 132-140, 133-141, 134-142, 135-143 AND 136-144 OTHERWISE PINS 105 THRU 112 AND 137 THRU 144 ARE NOT USED
- 3 FOR STRAPPING CONNECTIONS USE NO. 22 AWG BUS WIRE AND SOLDER WIRE BETWEEN THE APPROPRIATE TERMINALS LISTED IN THE STRAP TERMINAL COLUMN
- 4 WIRING AND STRAPPING CONNECTIONS FOR THE AN/FCC-67 SHOWN ABOVE ARE FOR 16 CHANNEL DUPLEX, LOW LEVEL 6 VOLTS POLAR OPERATION

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
DESIGN BY J RAMEY DRAFTSMAN J KALLBERG CHECKER <i>JS</i> DATE 20 APR 76 ORGANIZATION APPROVAL		ORGANIZATION USACEEIA-CED FORT MONMOUTH, ARIZONA		
		SIGNAL CABLE TERMINATING DETAILS		
APPROVAL		DOWNSIGHT NO. 50470	SIZE D	COM-TC03-118
SCALE NONE			SHEET 8 OF 13	

LOOP KEYS STRAPPING	
OUTPUT SIGNAL MODE	INTERNAL BATTERY
50-MA NEUTRAL	1-2
	5-6
	8-9
	10-12
20-MA POLAR	1-2
	4-5
	8-9
	10-12
5 VOLT POLAR	1-2
	4-5
	5-7
	6-8
	10-12

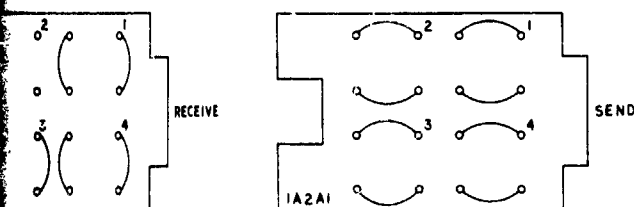


REVISIONS			
SYN	ZONE	DESCRIPTION	DATE
A		MINOR REVISIONS SHEET NUMBER WAS 7 OF 8	1 NOV 78



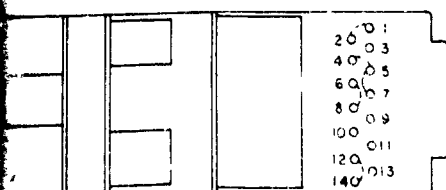
#### AN/FCC-67 SPARE LINE AMPLIFIER CONNECTIONS

STRAPPED, BROKEN LINES TO AMPLIFY LINE 1. FOR LINE 2, 15 TO 41 AND 31 TO 42 FOR LINE 3, STRAP 14 TO 41 AND 30 FOR LINE 4, STRAP 13 TO 41 AND 29 TO 42



#### AN/FCC-67 SUB-SYSTEM AMPLIFIERS STRAPPING

AMPLIFIERS SHOWN STRAPPED FOR SEND OR RECEIVE OPERATION



#### AN/FCC-67 LOOP KEYS

KEYS SHOWN STRAPPED FOR LOW LEVEL 6 VOLT POLAR SIGNALS USING INTERNAL BATTERY

#### LOOP KEYS STRAPPING

OUTPUT MODE	STRAPPING TERMINALS	
	INTERNAL BATTERY	EXTERNAL BATTERY
NEUTRAL	1-2	2-3
	5-6	
	6-8	
	10-12	
POLAR	1-2	2-3
	4-5	4-9
	6-8	14-2
	8-10	
POLAR	1-2	3
	4-5	4-9
	5-7	4-12
	6-8	3

#### AN/FCC-67 PRIMARY POWER STRAPPING

UNIT	QTY	STRAP TERMINALS	
		115 VOLTS	230 VOLTS
TONE KEYER	16	44 TO 45 46 TO 47	45 TO 46
TONE CONVERTER	32	6 TO 5 3 TO 4	4 TO 5
LOOP KEYS	16	19 TO 20 18 TO 21	20 TO 21
LINE AMPLIFIER POWER SUPPLY	1	1 TO 2 3 TO 4	2 TO 3
AUDIBLE ALARM	1	C TO B	REMOVE STRAP
SUB-SYSTEM POWER SUPPLY	1	1 TO 2 3 TO 4	2 TO 3
TEST PANEL	1	1 TO 2 3 TO 4	2 TO 3
FAN POWER SUPPLY	1	ITB2-2 TO ITB2-1 AND ITB2-3 TO ITB2-4	ITB2-2 TO ITB2-3

#### AN/FCC-67 EXTERNAL LOOP BATTERY INPUT CONNECTIONS

EXTERNAL BATTERY NUMBER 1		EXTERNAL BATTERY NUMBER 2	
PLUS (+) ITB1-160	MINUS (-) ITB1-159	PLUS (+) ITB1-158	MINUS (-) ITB1-157

DESCRIPTION	FSN	UI	Q
LIST OF MATERIALS			
ORGANIZATION USACEEIA-CED FORT MONROE, ARIZONA			
SIGNAL CABLE TERMINATING DETAILS			
DRAWN BY J. HANEY		DATE APR 76	
CHECKED BY J. HANEY		DATE APR 76	
APPROVAL		CODE IDENT NO	BASE
		50470	D
		COM-TC03-118	
SCALE NONE		SHEET 9 OF 13	

A

TYPICAL CROSSCONNECTS AT THE TOP OF  
A LINE CONDITIONING RACK REPRESENTING  
A 2-WAY VF USER WITH 20Hz SIGNALING  
OR LOOP SIGNALING (SEE BLOCK SCHEMATIC  
SHEET )

5

4

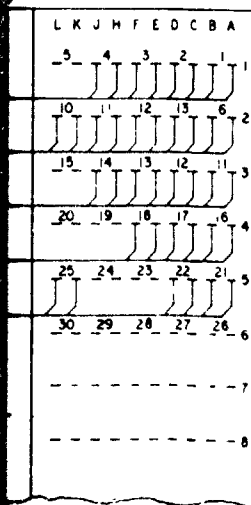
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2

1

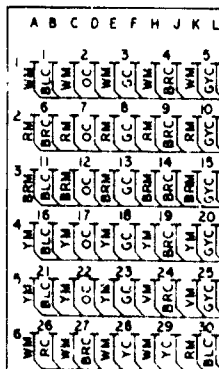
REVISIONS			
SYM	ZONE	DESCRIPTION	DATE
A		MINOR REVISIONS. SHEET NUMBER WAS 8 OF 8.	1 NOV 78

TERMINAL BLOCK - I



SHELF I

TB-I



CABLE A SHELF I

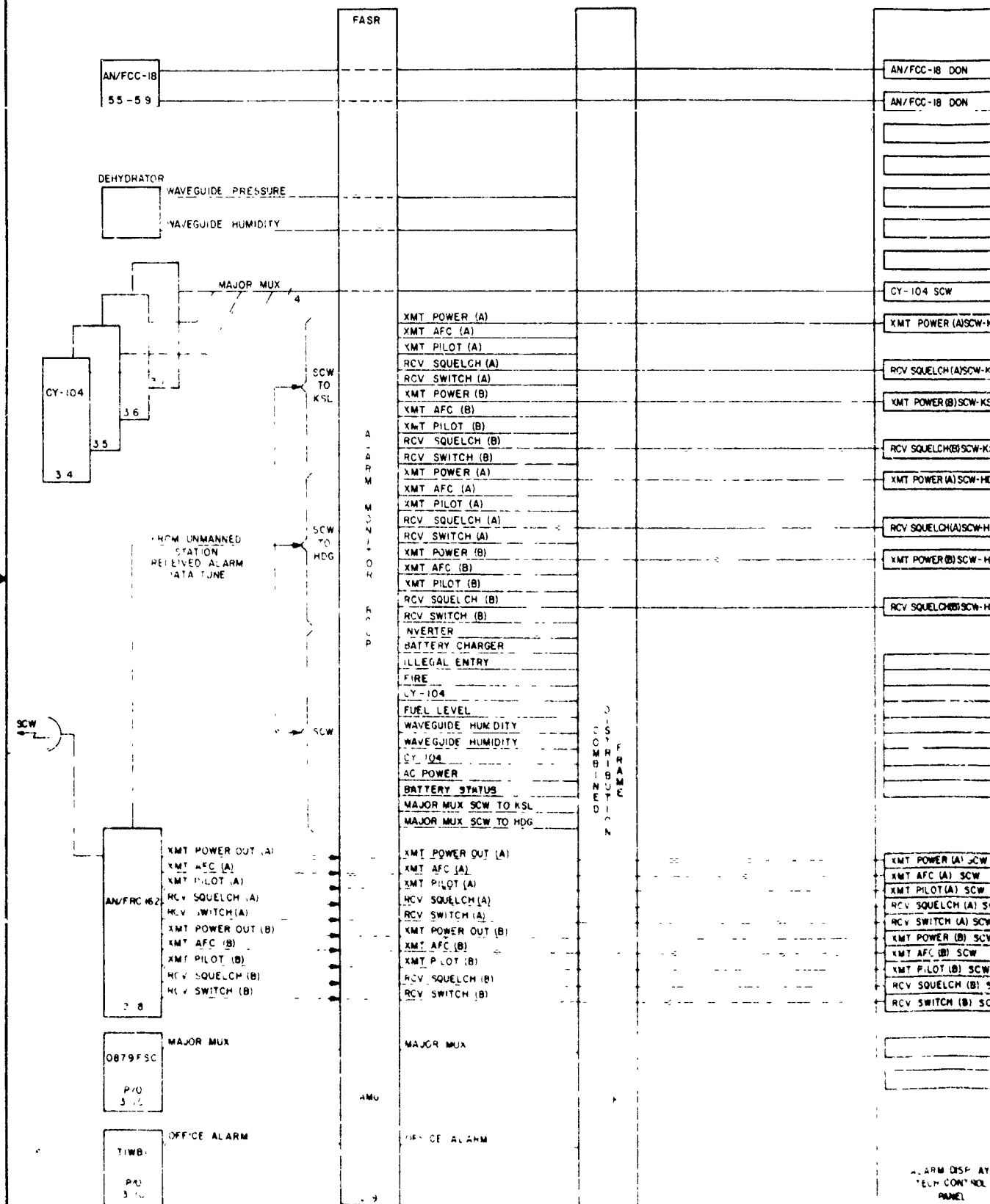
TYPICAL CROSSCONNECT

REAR VIEW OF A LCF RACK

THE TOP OF  
REPRESENTING  
MHz SIGNALING  
LOCK SCHEMATIC

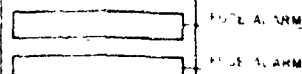
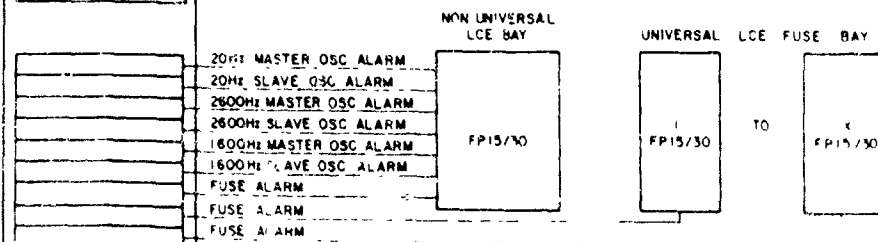
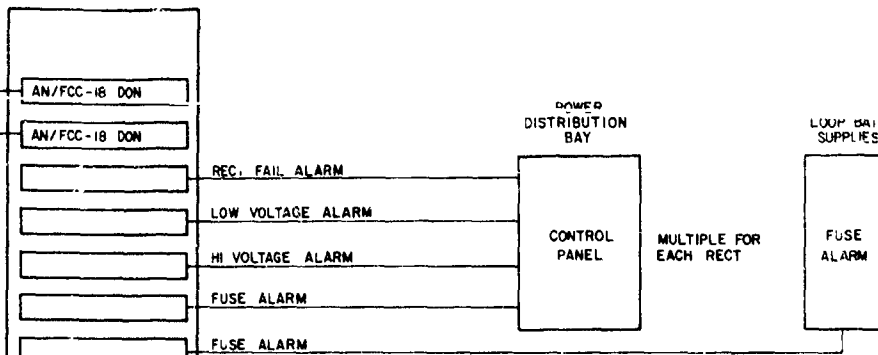
SYM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
USACEEIA-CED				
PORT HAWCHING, ARIZONA				
SIGNAL CABLE TERMINATING DETAILS				
50470 D, COM-TC03-18				

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TYPICAL TECHNICAL CONTROL FACILITY ALARM SYSTEM

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REV 50470 REDRAWN SHT NO. CHANGED	1 NOV 78	















ITEM	AEL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
DEPT NO			ORGANIZATION		
			U.S. ARMY COMMUNICATIONS-ELECTRONICS		
			ENGINEERING INSTALLATION AGENCY		
DESIGNED BY			DATE		
DRAWN BY			DATE		
CHECKED BY			DATE		
APPROVED BY			DATE		
LIST OF MATERIALS			DATE		
NEXT ASSEMBLY			SECTION		
DWS INDEX NO			DATE		
SIZE			DRAWING NO		
D			50470		
DATE			NOV 78		
DRAWING NO			COM-TC03-118		
DATE			NOV 78		

SIGNAL CABLE TERMINATING DETAILS

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# ALARM MONITOR GROUP ALARM DISPLAY PANEL

POWER MODULE	SR	INT	ENC (1)	ENC (2)	ENC (3)	DECODE (4)	DECODE (5)	DECODE (6)	STA
CKT   F1 F2   AUDIBLE DISABLE  RESET SLAVE  NORM	ERROR 	DE'ODE 	1	1	1	1	1	1	STATION  MAJ  ALARMS  NO ANS  DISABLE  MANUAL INTER 
			2	2	2	2	2	2	
			3	3	3	3	3	3	
			4	4	4	4	4	4	
			5	5	5	5	5	5	
			6	6	6	6	6	6	
			7	7	7	7	7	7	
			8	8	8	8	8	8	
			9	9	9	9	9	9	
			10	10	10	10	10	10	
			11	11	11	11	11	11	
			12	12	12	12	12	12	

LOSS OF P  
LOOP BACK  
CARRIER GI  
FAULT (BIT  
REC FRAME  
REC DATA

LOSS OF FF  
LOSS OF MI  
FRAME ERR  
LOOP BACK  
LOSS OF MB  
LOSS OF PO  
LOSS OF PC  
MAIN ON LI  
STANDBY O  
REMOTE SW  
MANUAL SW  
AUTO SWIT  
STANDBY F

XMT POWE  
XMT FREQ  
MODULATO  
DEMODULA  
POWER ON  
REC AFC  
DATA / TIM  
DATA / TIM

ENCODER ALARM DISPLAY PANEL (1)			
LIGHT	FAULT	TRANSCIVER	RADIO
1	XMT POWER	A	HOG TO SCW
2	XMT AFC	A	HOG TO SCW
3	XMT PILOT	A	HOG TO SCW
4	RCV SQUELCH	A	HOG TO SCW
5	RCV SWITCH	A	HOG TO SCW
6	XMT POWER	B	HOG TO SCW
7	XMT AFC	B	HOG TO SCW
8	XMT PILOT	B	HOG TO SCW
9	RCV SQUELCH	B	HOG TO SCW
10	RCV SWITCH	B	HOG TO SCW
11	XMT POWER	A	HOG TO DON
12	XMT PILOT	A	HOG TO DON

DECODER ALARM DISPLAY PANEL (4)			
LIGHT	FAULT	TRANSCIVER	RADIO
1	XMT POWER	A	SCW TO KSL
2	XMT AFC	A	SCW TO KSL
3	XMT PILOT	A	SCW TO KSL
4	RCV SQUELCH	A	SCW TO KSL
5	RCV SWITCH	A	SCW TO KSL
6	XMT POWER	B	SCW TO KSL
7	XMT AFC	B	SCW TO KSL
8	XMT PILOT	B	SCW TO KSL
9	RCV SQUELCH	B	SCW TO KSL
10	RCV SWITCH	B	SCW TO KSL
11	XMT POWER	A	SCW TO HOG
12	XMT AFC	A	SCW TO HOG

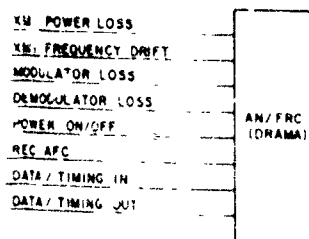
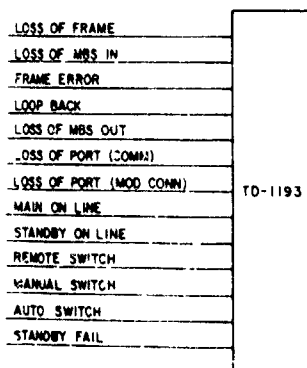
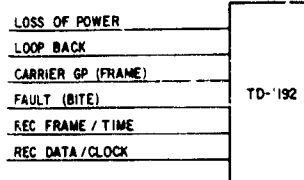
ENCODER ALARM DISPLAY PANEL (2)			
LIGHT	FAULT	TRANSCIVER	RADIO
1	RCV LEVEL	A	HOG TO DON
2	RCV PILOT	A	HOG TO DON
3	XMT POWER	B	HOG TO DON
4	XMT PILOT	B	HOG TO DON
5	RCV LEVEL	B	HOG TO DON
6	RCV PILOT	B	HOG TO DON
7	FCC -1B		HOG TO DON
8	FCC -1B		HOG TO DON
9	MAJOR MUX		HOG TO SCW
10	MINOR MUX		HOG TO SCW
11	T/WB1		HOG TO SCW
12	BLANK		

DECODER ALARM DISPLAY PANEL (5)			
LIGHT	FAULT	TRANSCIVER	RADIO/SYSTEM
1	XMT PILOT	A	SCW TO HOG
2	RCV SQUELCH	A	SCW TO HOG
3	RCV SWITCH	A	SCW TO HOG
4	XMT POWER	B	SCW TO HOG
5	XMT AFC	B	SCW TO HOG
6	XMT PILOT	B	SCW TO HOG
7	RCV SQUELCH	B	SCW TO HOG
8	RCV SWITCH	B	SCW TO HOG
9	BLANK		
10	MAJOR MUX		SCW TO KSL
11	BLANK		
12	MINOR MUX		SCW TO HOG

ENCODER ALARM DISPLAY PANEL (3)		
LIGHT	FAULT	SYSTEM
1	BLANK	
2	BLANK	
3	BLANK	
4	BLANK	
5	BLANK	
6	BLANK	
7	BLANK	
8	WAVEGUIDE PRESSURE	HOG TO SCW
9	WAVEGUIDE HUMIDITY	HOG TO SCW
10	TOWER LIGHTS	
11	BLANK	
12	BLANK	

DECODER ALARM DISPLAY PANEL (6)		
LIGHT	FAULT	LOCATION/SYSTEM
1	INVERTER	SCW
2	BATTERY CHARGER	SCW
3	LEGAL ENTRY	SCW
4	LINE	SCW
5	LY -104	SCW TO KSL
6	LY -104	SCW TO HOG
7	FUEL LEVEL	SCW
8	WAVEGUIDE PRESSURE	SCW
9	WAVEGUIDE HUMIDITY	SCW
10	BLANK	
11	AC POWER	SCW
12	BATTERY STATUS	SCW

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		REVISED AND REDRAWN SHT NO CHANGED	1 NOV 78	CEZ



ITEM	ALL	DESCRIPTION	NSN	UI	QTY
LIST OF MATERIALS					
U.S. ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY					
SIGNAL CABLE TERMINATING DETAILS					

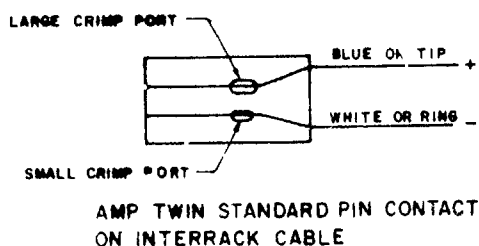
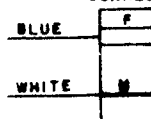
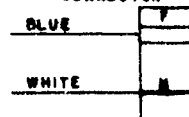
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6

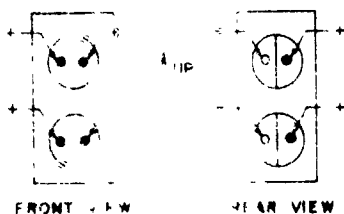
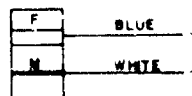
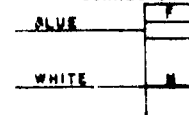
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D

POLARIZED TWINAX  
CONNECTORPOLARIZED TWINAX  
CONNECTOR

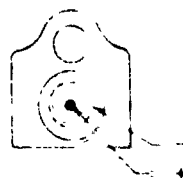
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AN/G

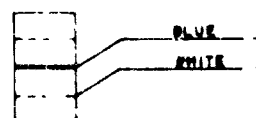
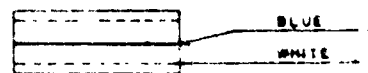
COOKE TWINTERM  
PATCH JACKPOLARIZED TWINAX CONNECTOR  
NOTE 1303POLARIZED TWINAX  
CONNECTOR

CV 30

C

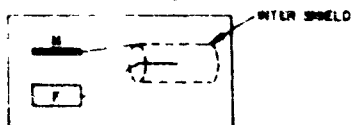
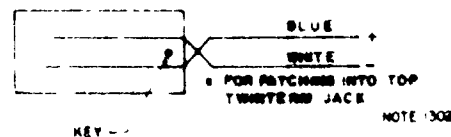


TROMPETER 78 OHM PATCH JACK

CONCENTRIC TWINAX CONNECTOR  
NOTE 1304

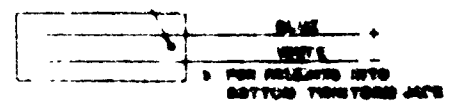
TROMPETER TWINAX PATCH PLUG

BNC ADAPTER

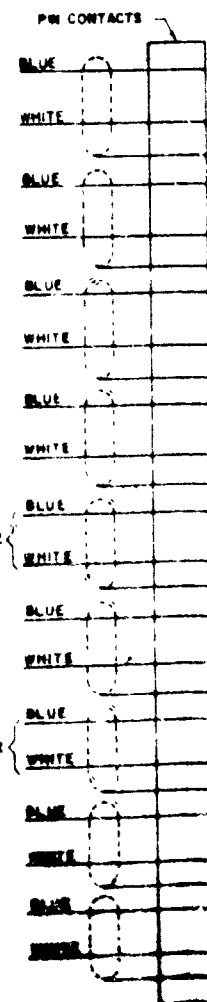
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KEY -

KEY -



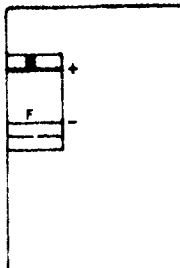
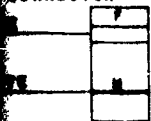
COOKE TWINAX PATCH PLUG



A

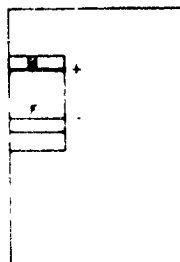


SHIELDED TWINAX  
CONNECTOR



AN/GSC-24

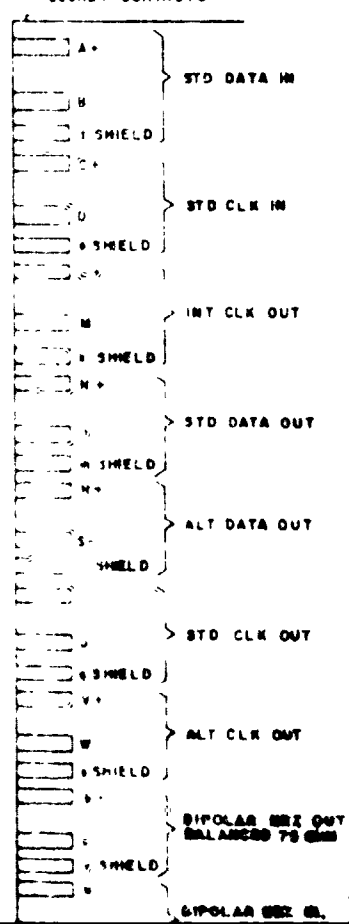
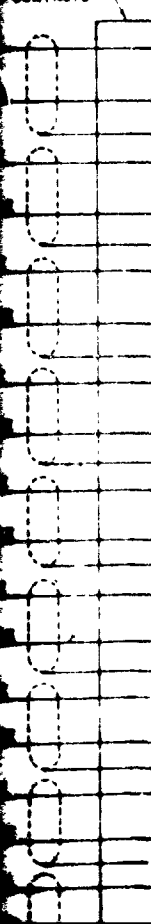
SHIELDED TWINAX  
CONNECTOR



CV 3034

CONTACTS

SOCKET CONTACTS



REVISION			
ZONE	REV	DESCRIPTION	DATE
A		REVISED AND REDRAWN SHY NO CHANGES	NOV 78

# NOTES

- 1301 FOR OTHER MODERN INPUT/OUTPUT CONTACTS SEE TCM-222-002-2, TABLES 2.3 AND 2.4
- 1302 WHEN ALTERNATE CLOCK AND ALTERNATE DATA OUTPUTS ARE NOT USED, INSTALL A 75 OHM 1/2 W RESISTOR BETWEEN THE + AND - CONTACTS OF THE CABLE CONNECTOR.
- 1303 AMPHENOL 24-224 OR EQUIVALENT, USED WITH 3000 P/P JACKS
- 1304 THOMPSON PL 75-3 OR EQUIVALENT, USED WITH THOMPSON P/P JACKS

ITEM	QTY	DESCRIPTION	REV	UN	QTY
LIST OF MATERIALS					
ORGANIZATION U.S. ARMY COMMUNICATIONS - ELECTRONICS ENGINEERING INSTALLATION AGENCY					
DESIGNED BY DRAWN BY CHECKED BY APPROVED BY					

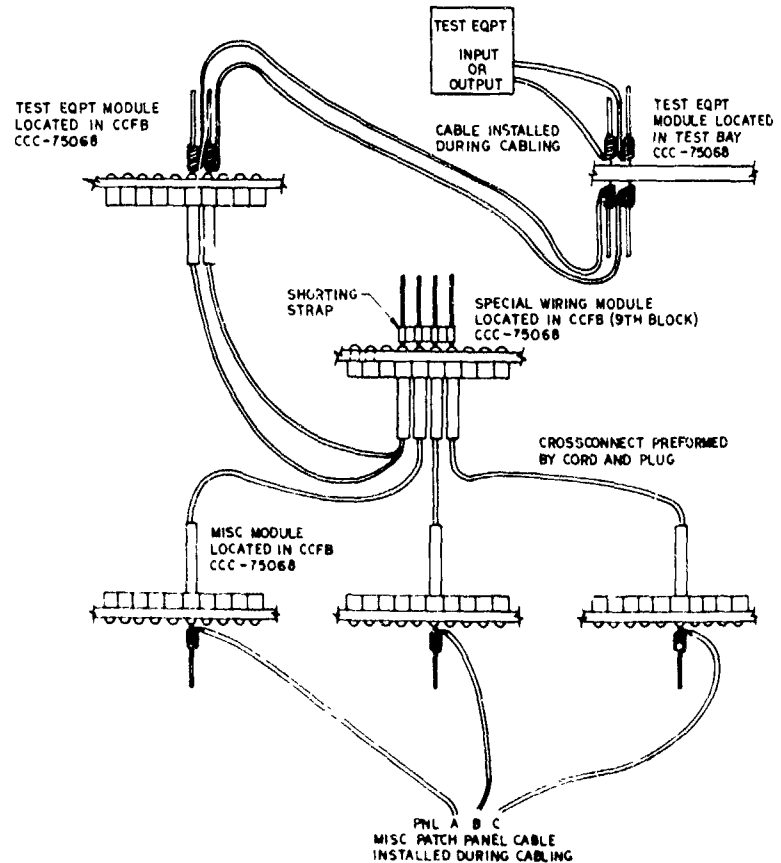
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DETAIL A  
WIRING DIAGRAM OF DETAIL B

5

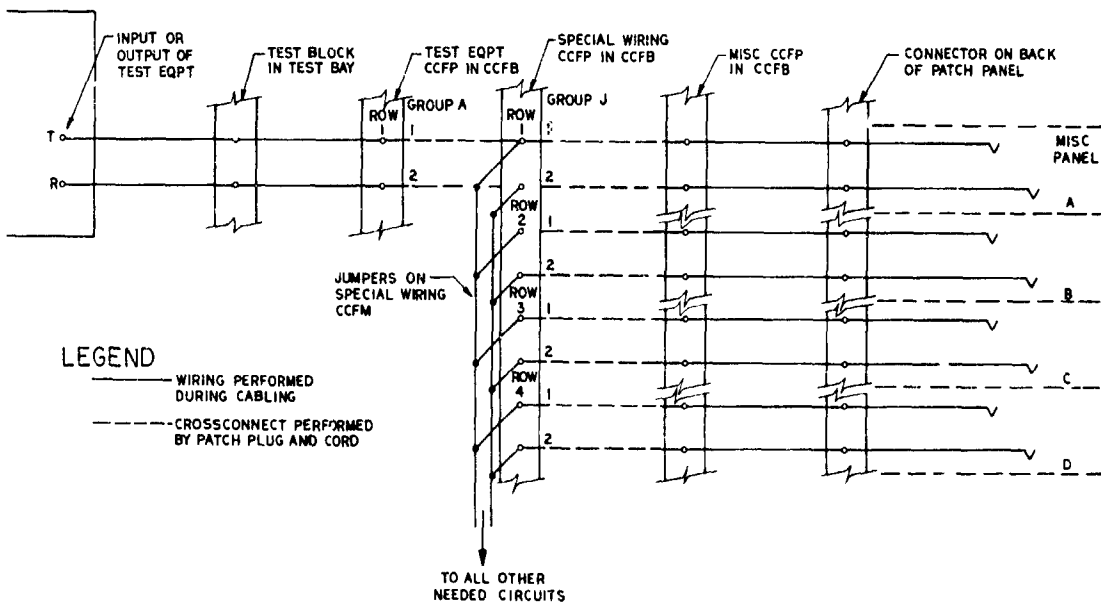
4

3

2

1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS	7 NOV 78	NB



DETAIL B  
SCHEMATIC OF DETAIL A

BAY	CCFM	GROUP ROW / PIN	FUNCTION	GROUP ROW / PIN	CCFM	BAY
2 1	1	A-1-A AND B	TEST EQPT INPUT(OUTPUT)	J-1-A AND B	1	2 1
	1	J-1-	JUMPER	J-2-	1	
	1	2-	JUMPER	J-3-	1	
	1	3-	JUMPER	J-4-	1	
	MISC	J-1-	ACCESS FOR PANEL A	X-1-	X	
		J-2-	ACCESS FOR PANEL B	X-1-	X	
		J-3-	ACCESS FOR PANEL C	X-1-	X	
2 1	MISC	J-4-A AND B	ACCESS FOR PANEL D	X-1-A AND B	X	2 1

DETAIL C

- 1 CCFP NUMBER WOULD BE ASSIGNED DEPENDING ON THE CABLE RUNNING AND THE CIRCUIT TO BE USED
- 2 AN ALPHANUMERICAL WILL BE USED FOR IDENTIFICATION

ITEM	DESCRIPTION	FSH	UI	QTY
LIST OF MATERIALS				
ORGANIZATION USACEEIA-CED FORT MONROE, ARIZONA				
DESIGN BY	J RAMEY	INTERBAY AND MISCELLANEOUS PANEL WIRING DETAILS		
DRAFTSMAN	M BOLLACK			
CHECKER	[Signature]			
DATE	20 APR 78			
ORGANIZATION APPROVAL	[Signature]	CODE IDENT NO	DATE	
		50470	D	COM-TC03-119
APPROVAL				

TC03-103 DE P 006

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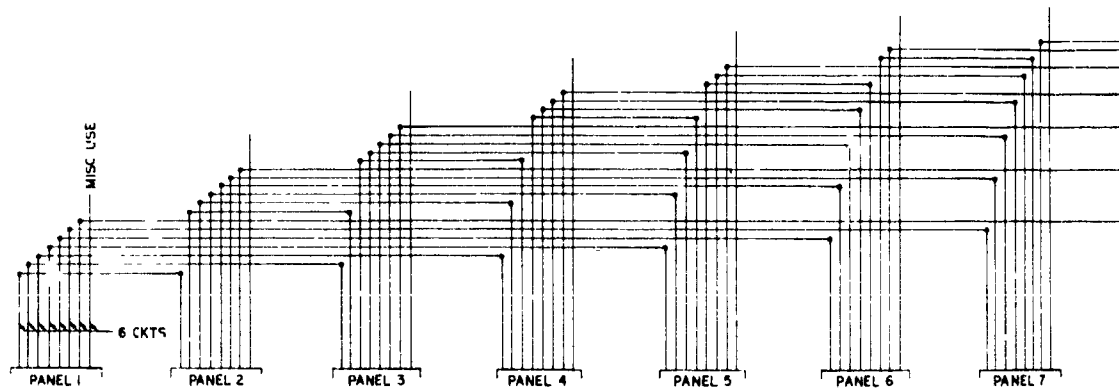
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D

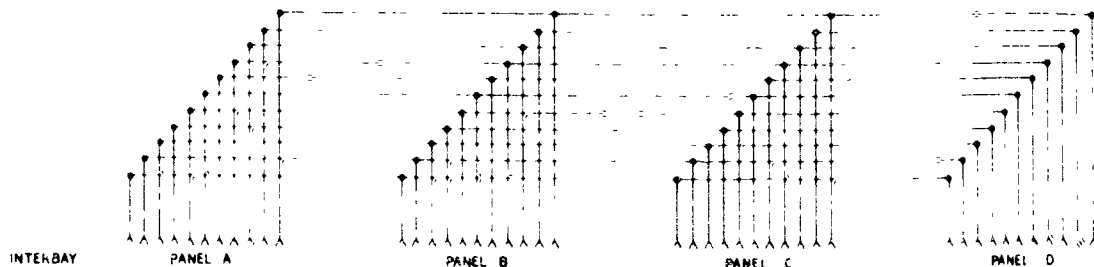


C

DETAIL E  
INTERBAY WIRING EXAMPLE  
8 INTERBAY PANELS, 6 CKTS PER PANEL  
RECOMMENDED FOR VF;  
CAN BE USED FOR DC

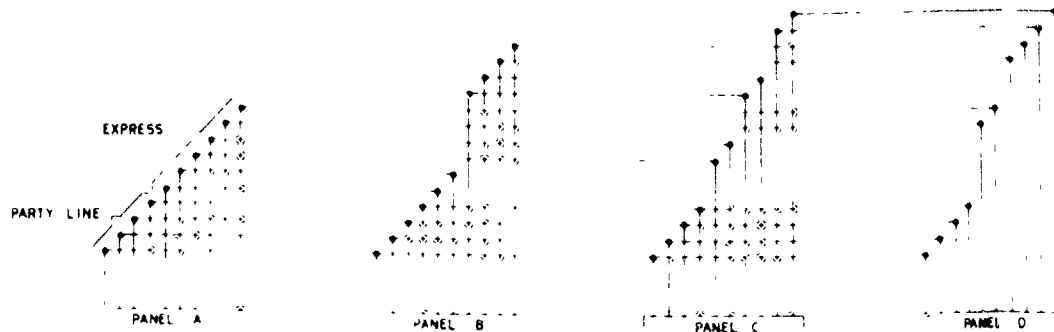
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B



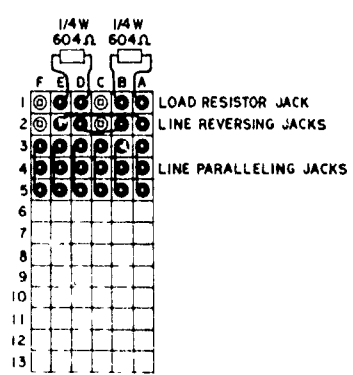
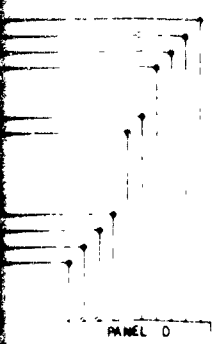
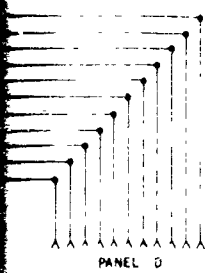
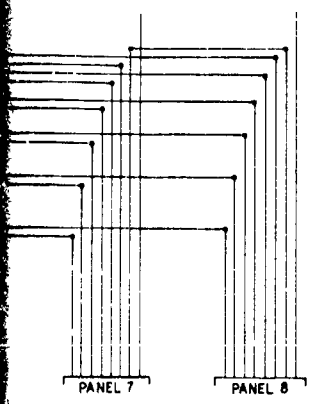
DETAIL F  
DC PANELS INTERBAY TRUNK WIRING  
PARTY LINE

A

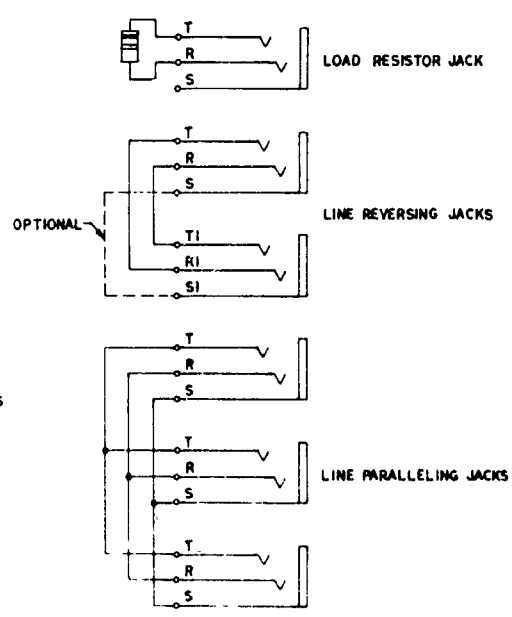


DETAIL G  
DC PANEL INTERBAY TRUNK WIRING  
PARTY LINE AND EXPRESS

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS	7 NOV 76	MB



REAR VIEW VF MISC BLOCK  
CCC-75068

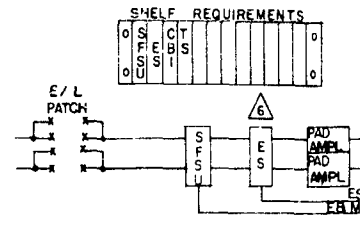


VF MISC PANEL

DETAIL D

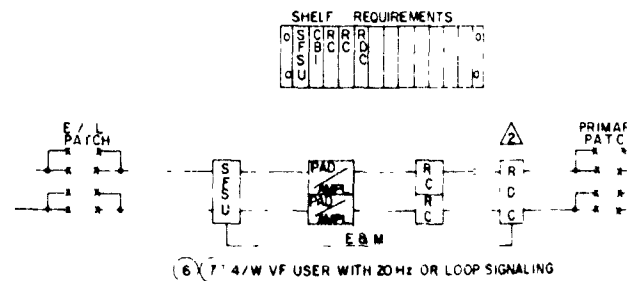
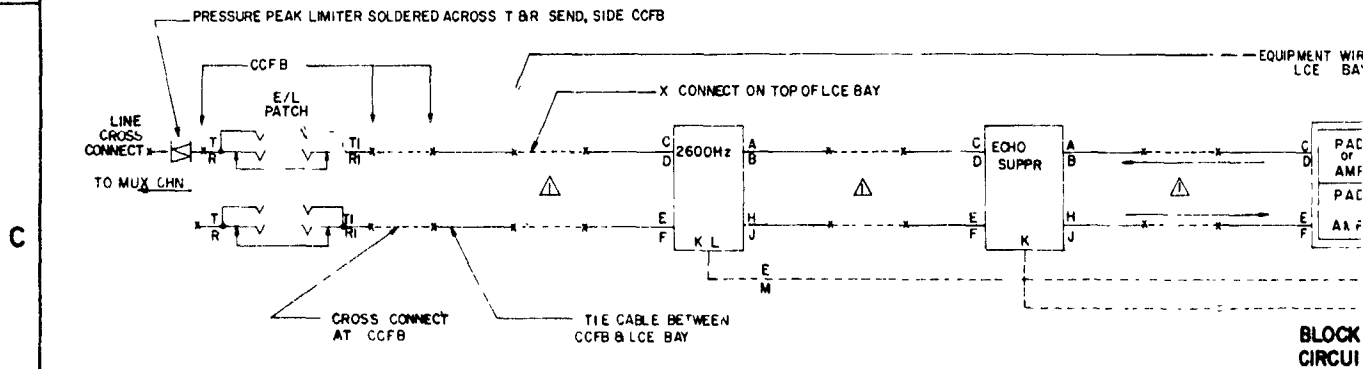
ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
<div>DESIGN BY J. RAMEY</div> <div>DRAFTSMAN M. BOLLACK</div> <div>CHECKER M. [Signature]</div> <div>DATE 20 APR 76</div> <div>ORGANIZATION [Signature]</div> <div>APPROVAL [Signature]</div>		Observation		
		USACEEIA-CED		
		PORT HANDBOOK, AMBROS		
		INTERBAY AND MISCELLANEOUS		
		PANEL WIRING DETAILS		
CODE SHEET NO.		SIZE	COM-TC03-119	
50470		D		
SCALE: NONE		SHEET 3 OF 3		

5



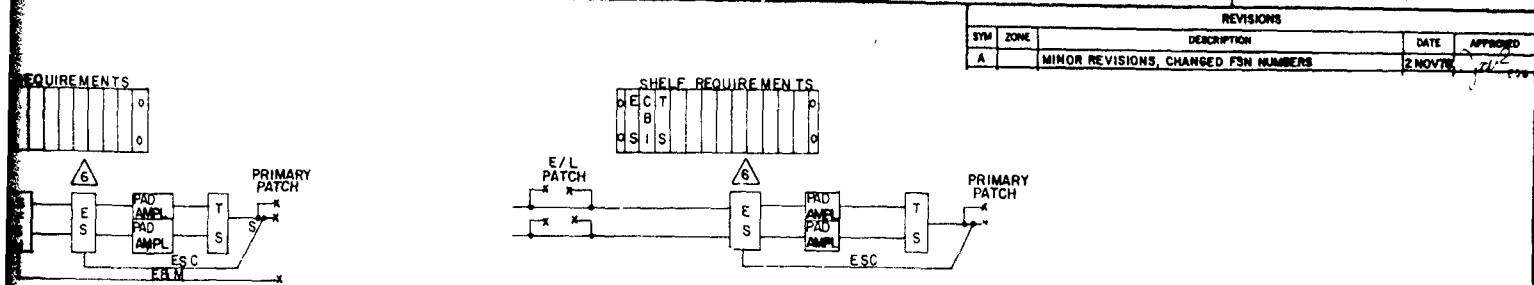
③ 2/W VF USER WITH

CIRCUITS PER MIL-STD-188-310, FIGURE 1  
AS SHOWN ① ON THE



 INDICATES STRING NUMBER PER MIL STD 188 3-0

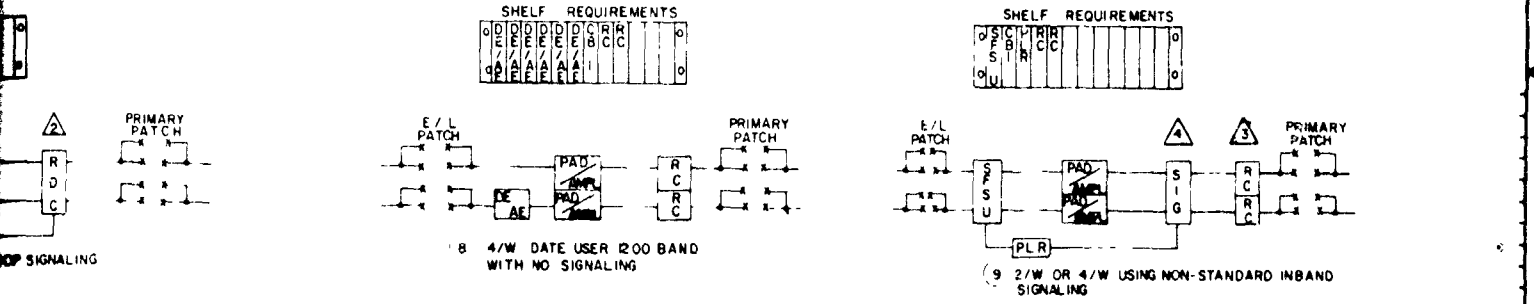
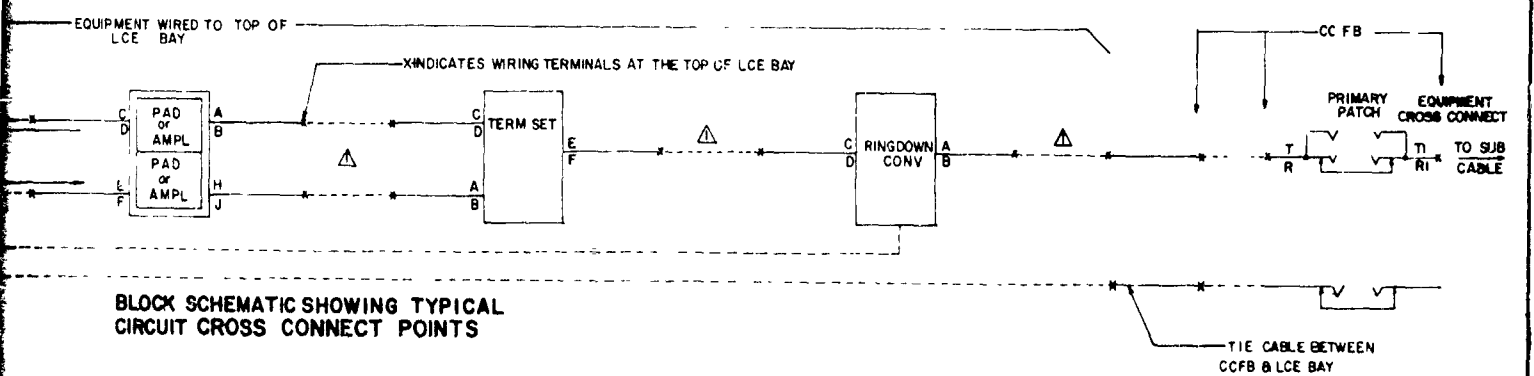
REF	COMMON NAME	STEL
DE	ENVELOPE DELAY EQUALIZER	JE 5
ES	ECHO SUPPRESSOR	ES 4B
RDC	RING DOWN CONVERTER	RDC-4A
T5	2 4 WIRE TERM SET	473 2B
PMO	STRAPPABLE PMO	AT 2
CB 1	CARRIER BOARD	CB 1
AMP	LINE AMPLIFIER	LA 3
SFSU	3 F SIGNALING UNIT	SFSU-26
SFSU	5 F SIGNALING	SFSU '6
SSU 1600	SIGNALING SUPPLY UNIT	SSU 161
SSU 2600	SIGNALING SUPPLY UNIT	SSU 3/2
DX	SIGNAL LEAD EXTENSION UNIT	SLU DX 1
	EXTENDER BOARD	
	6W/4 W BRIDGE	BR 6W4W
BRDG		SRS 20 1
SSU 20HZ	20HZ RINGING GEN	AE 16
AE	AMPLITUDE EQUALIZER	RC 1
RC	REPEAT COIL	PLR 4B
PLR	PULSE LINK REPEATER	PLR 4B
PMO	PILOT MAKE BUSY RELAY	PMO 1
	PASSIVE PEAK LIMITER	



③ 2/W VF USER WITH EBM SIGNALING

④ 2/W VF USER WITH INTEGRAL SIGNALING

DD-188-310, FIGURE 1 A-E NUMBERED DOWN ① ON THIS SHEET



NAME	STELMA	NOMENCLATURE	FSN
BY EQUALIZER	UE 5	EQUALIZER, UNIVERSAL UE 5	5805-00-602-5133
CONVERTER SET	ES 48	ECHO SUPPRESSOR ES 48	5805-00-602-5152
UNIT	RDC 4A	RING DOWN CONVERTER CV 325Q/FTC	5805-00-602-5159
PLY UNIT	4TS 2B	IMPEDANCE MATCHING TA-943/FTC	5805-00-602-5120
PLY UNIT	AT 2	SIGNAL ATTENUATOR CN-1449/FTC	5805-00-602-5120
PLY UNIT	CB 1	CARRIER BOARD CB-1	5805-00-602-5120
PLY UNIT	LA 3	LINE AMPLIFIER AM 6745/FTC	5805-00-602-5127
PLY UNIT	SFSU-2600	FREQUENCY SIGNALING TA 942/FTC	5805-00-602-5128
PLY UNIT	SFSU 1600	FREQUENCY SIGNALING TA 941/FTC	5805-00-602-5128
PLY UNIT	SSU 1600	FREQUENCY SIGNALING TA 943/FTC	5805-00-602-5149
PLY UNIT	SSU 3/2600	FREQUENCY SIGNALING TA-944/FTC	5805-00-602-5149
PLY UNIT	SLUDX 1 DX 2	SIGNAL LEAD EXT UNIT TA 951/FTC	5805-00-602-5151
PLY UNIT	DR 6W4WR	EXTENDER BOARD MX 9664/FTC	5805-00-602-5151
PLY UNIT	SAS 20 C	CONFERENCE BRIDGE TA 948/FTC	5805-00-602-5151
PLY UNIT	AE 16	GENERATOR GROUP DV 54	5805-00-602-5151
PLY UNIT	RC 1	AMPLITUDE EQUALIZER CN-450/FTC	5805-00-602-5151
PLY UNIT	PLR 48	REPEAT COIL TA 932/FTC	5805-00-602-5151
PLY UNIT	PMS	CONVERTER REPEATER TA 947/FTC	5805-00-602-5151
PLY UNIT		STELMA PART NO 80009190 000	5805-00-602-5151
PLY UNIT		WESTERN ELECTRIC 100 A	5805-00-602-5151

ITEM	DESCRIPTION	FSN	UI	QTY
1	EQUALIZER, UNIVERSAL UE 5	5805-00-602-5133		1
2	ECHO SUPPRESSOR ES 48	5805-00-602-5152		1
3	RING DOWN CONVERTER CV 325Q/FTC	5805-00-602-5159		1
4	IMPEDANCE MATCHING TA-943/FTC	5805-00-602-5120		1
5	SIGNAL ATTENUATOR CN-1449/FTC	5805-00-602-5120		1
6	CARRIER BOARD CB-1	5805-00-602-5120		1
7	LINE AMPLIFIER AM 6745/FTC	5805-00-602-5127		1
8	FREQUENCY SIGNALING TA 942/FTC	5805-00-602-5128		1
9	FREQUENCY SIGNALING TA 941/FTC	5805-00-602-5128		1
10	FREQUENCY SIGNALING TA 943/FTC	5805-00-602-5149		1
11	FREQUENCY SIGNALING TA-944/FTC	5805-00-602-5149		1
12	SIGNAL LEAD EXT UNIT TA 951/FTC	5805-00-602-5151		1
13	EXTENDER BOARD MX 9664/FTC	5805-00-602-5151		1
14	CONFERENCE BRIDGE TA 948/FTC	5805-00-602-5151		1
15	GENERATOR GROUP DV 54	5805-00-602-5151		1
16	AMPLITUDE EQUALIZER CN-450/FTC	5805-00-602-5151		1
17	REPEAT COIL TA 932/FTC	5805-00-602-5151		1
18	CONVERTER REPEATER TA 947/FTC	5805-00-602-5151		1
19	STELMA PART NO 80009190 000	5805-00-602-5151		1
20	WESTERN ELECTRIC 100 A	5805-00-602-5151		1

REV	STATUS OF SHEETS	DESIGN BY	CHECKER	DATE	ORGANIZATION APPROVAL	CODE	QTY	REV	SCALE	DATE	APPROVAL
1	DESIGN	J. RAMEY		3 FEB 1978		50470	D		NONE		
2	DRAFTSMAN	L. KAUFMAN									
3	CHECKER										
4	DATE										
5	ORGANIZATION APPROVAL										
6	APPROVAL										
7	TC03 03	SEIP 006									
8	NEXT ASSY	USED ON									

LIST OF MATERIALS	
ORGANIZATION	USACEEIA-CED
PORT	PORT HONOLULU, HAWAII
EQUIPMENT INTERFACE WIRING	
CODE	50470
QTY	D
DATE	3 FEB 1978
APPROVAL	
SCALE	NONE
DATE	
APPROVAL	

8

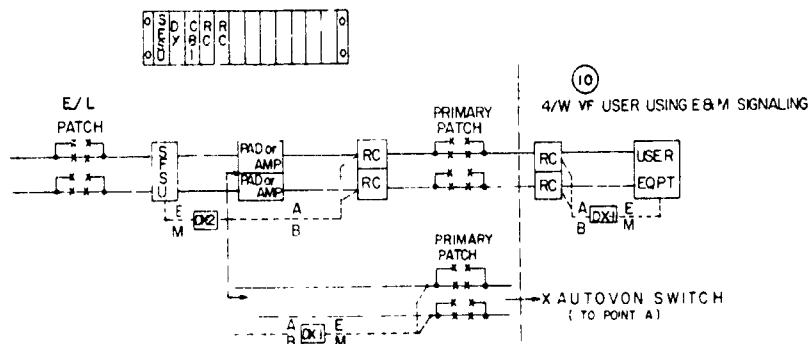
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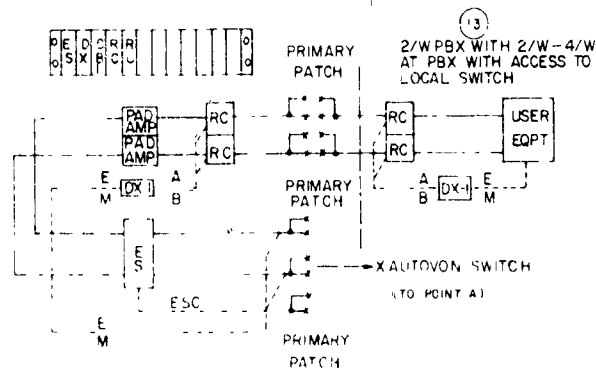
5

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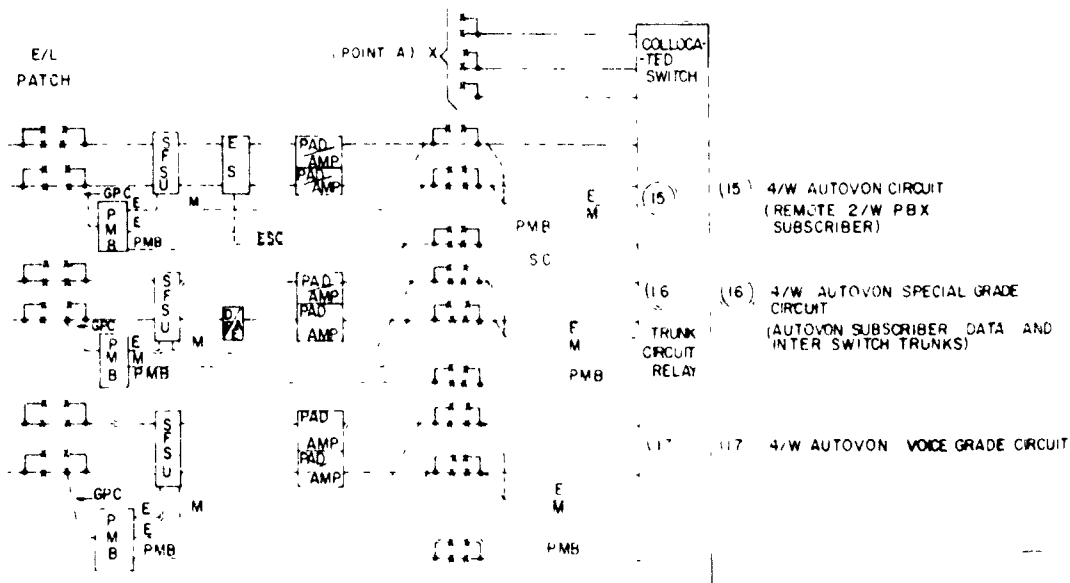
D



C



B



THIS MODULE IS NOT SUPPLIED AS A UNIVERSAL CONDITIONING MODULE

A

(22) 4/W TOLL CABLE



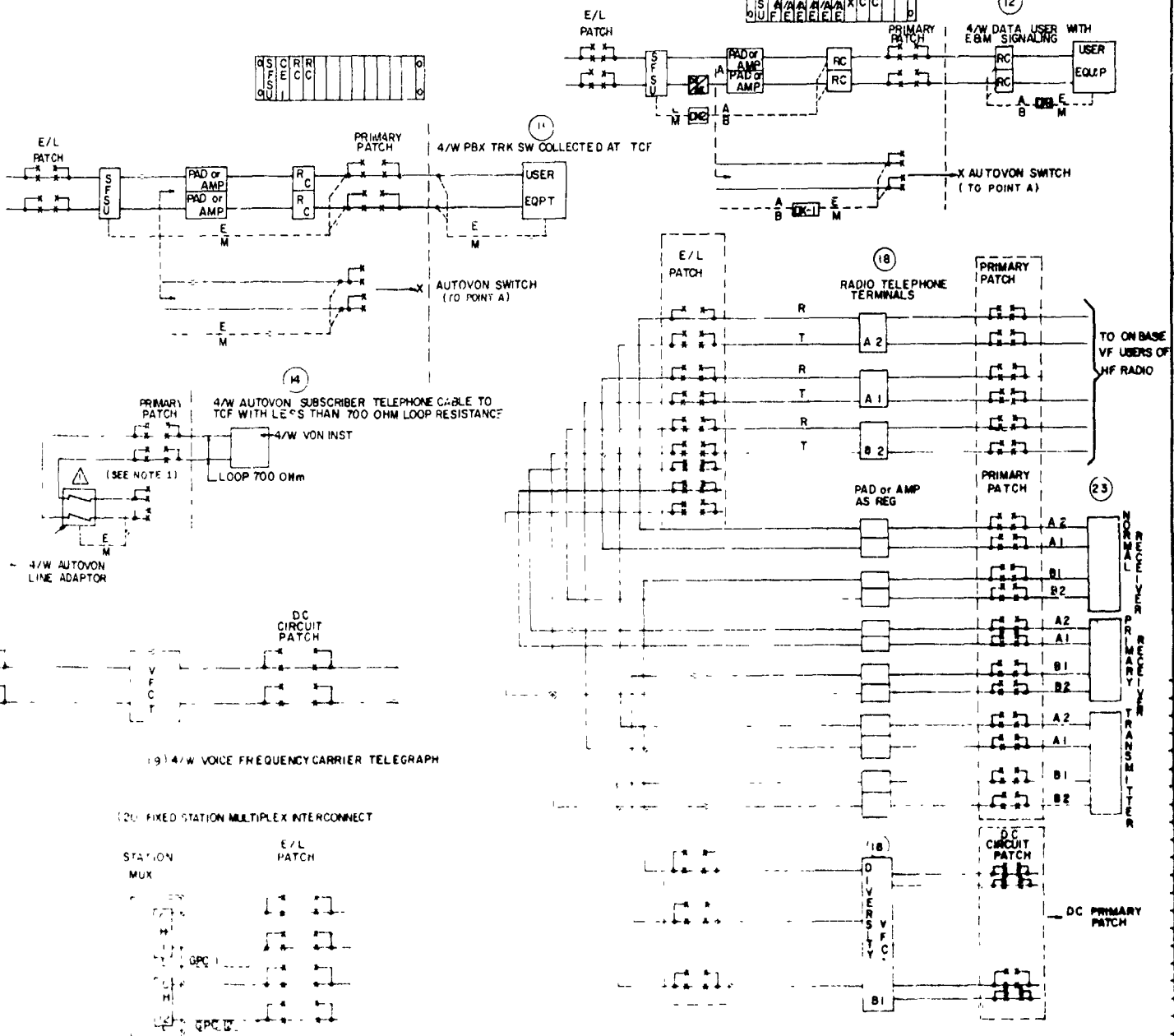
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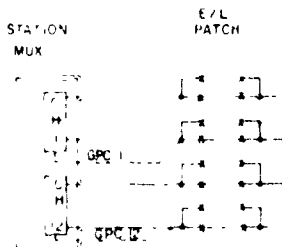
1

REVISIONS				DATE	APPROVED
SYN	ZONE	DESCRIPTION			
A		MINOR REVISIONS, SHEET NUMBER WAS 4 OF 5		2 NOV 76	



19 4/W VOICE FREQUENCY CARRIER TELEGRAPH

20 FIXED STATION MULTIPLEX INTERCONNECT



18 VOICE AND TELEGRAPH USER USING HF RADIO

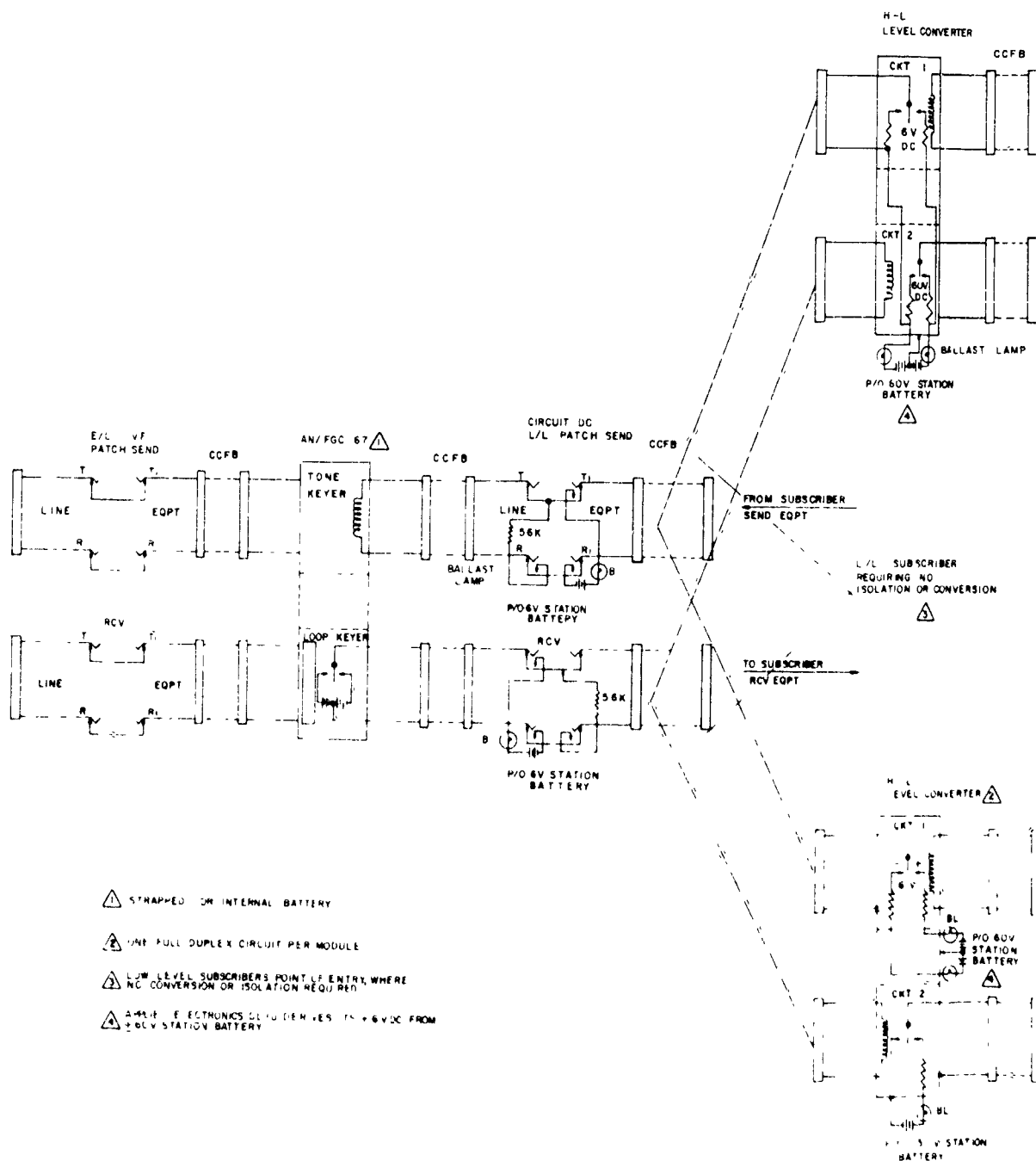
23 4/W CONNECTIONS TO HF RADIO SYSTEM

ITEM	DESCRIPTION	FBN	UI	QTY
LIST OF MATERIALS				
USACEEIA-CED				
DESIGN BY J. RAMEY				
DRAFTSMAN SPG L A KAUFMAN				
CHECKER				
DATE 20 FEB 76				
ORGANIZATION APPROVAL				
50470 D COM-TC03-420				
APPROVAL				

21 NON DCS MUX USER TO DCS USER ON BASE, OR USING THIS TRANSMISSION FACILITIES

22 4/W ENTRANCE TOLL CABLE

**A**



5

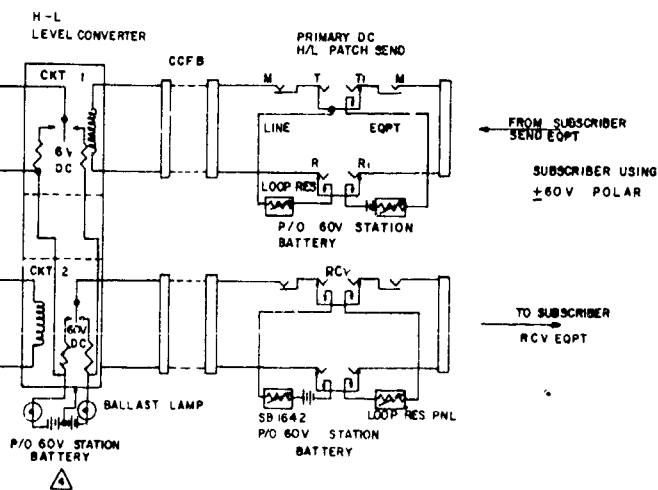
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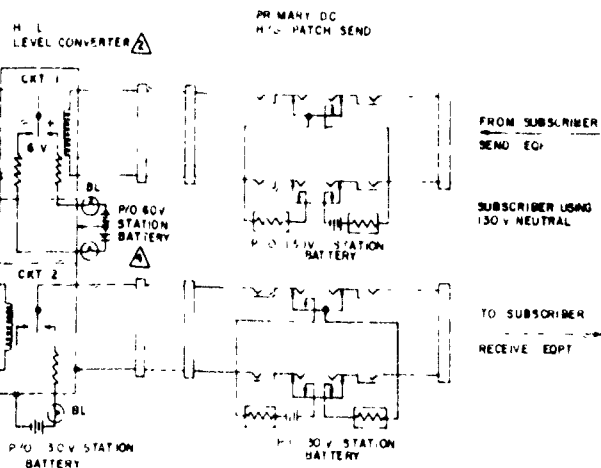
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REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISIONS, SHEET NUMBER WAS 5 OF 5	2 NOV 76	<i>[Signature]</i>



L/L SUBSCRIBER  
REQUIRING NO  
ISOLATION ON CONVERSION

△



ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
		ORGANIZATION USACEEIA-CED FORT HARRIS, ARIZONA		
DESIGN BY J. RAMEY		EQUIPMENT INTERFACE WIRING		
DRAFTSMAN SP6 L. A. KAUFMAN				
CHECKER <i>[Signature]</i>				
DATE 2 APR 76				
ORGANIZATION APPROVAL		CODE IDENT NO.	SIZE	

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D

C

B

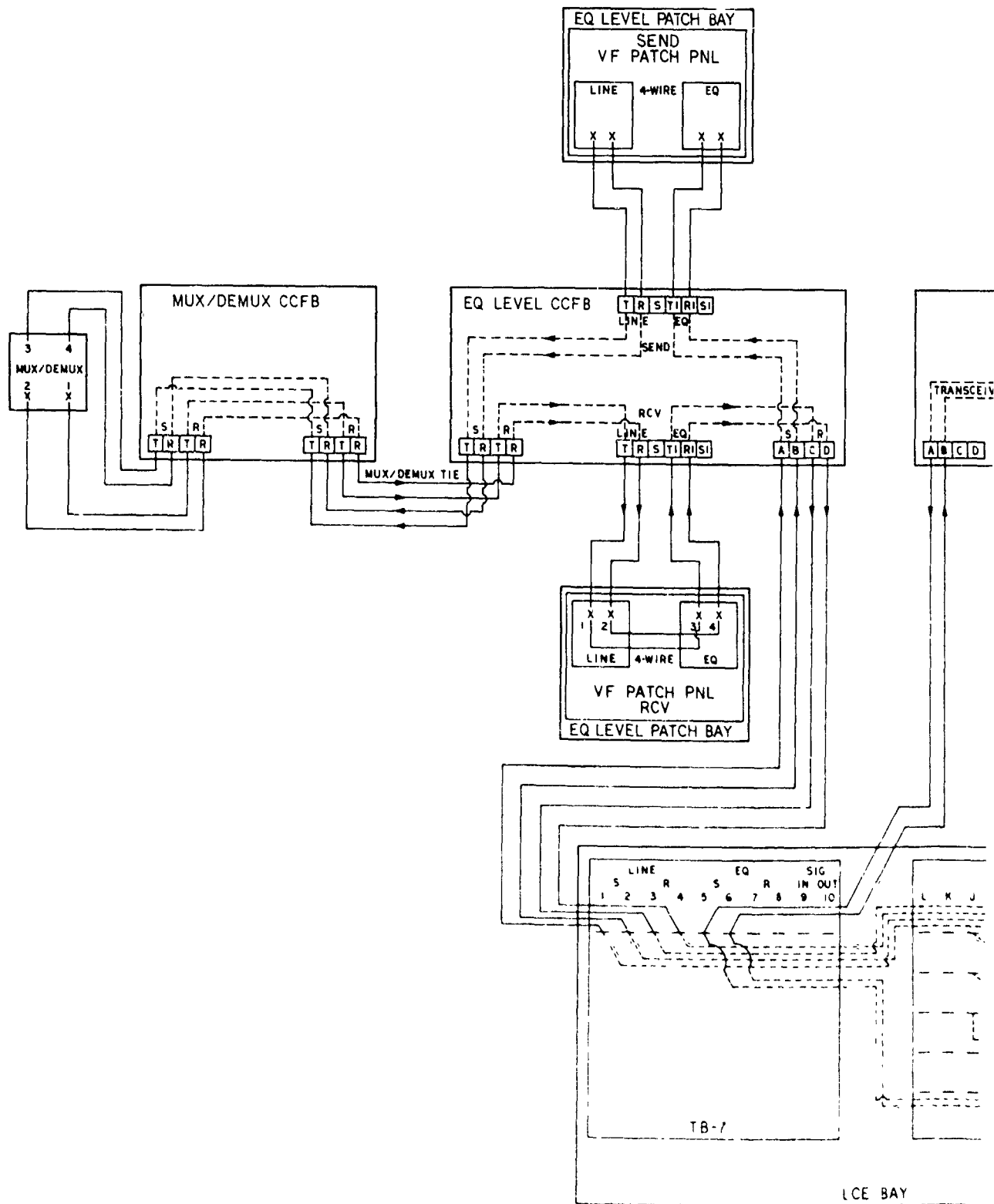
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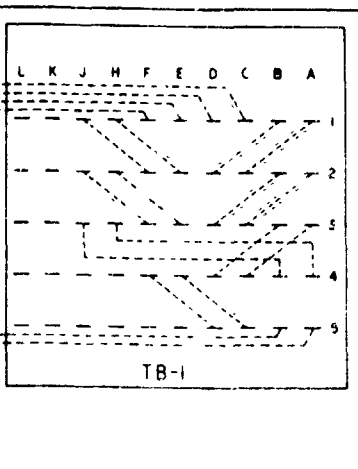
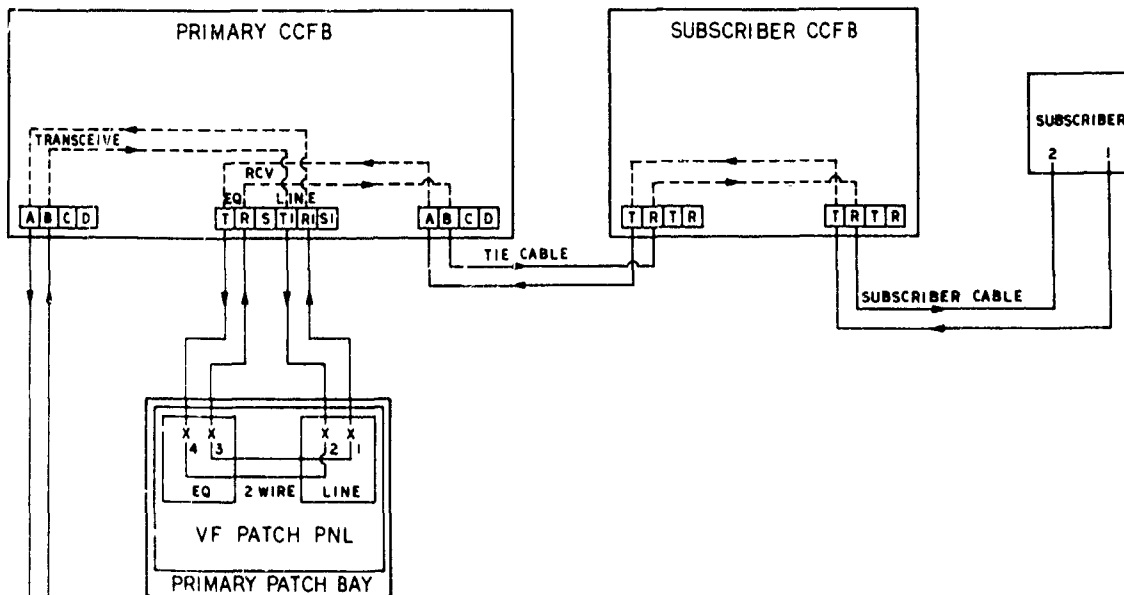
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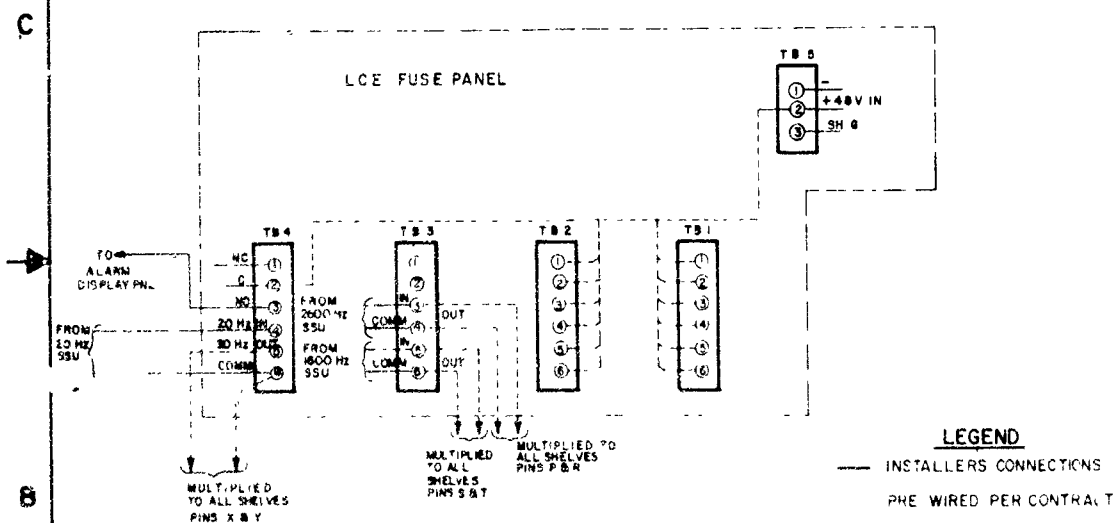
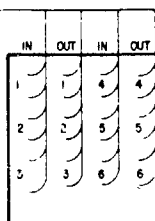
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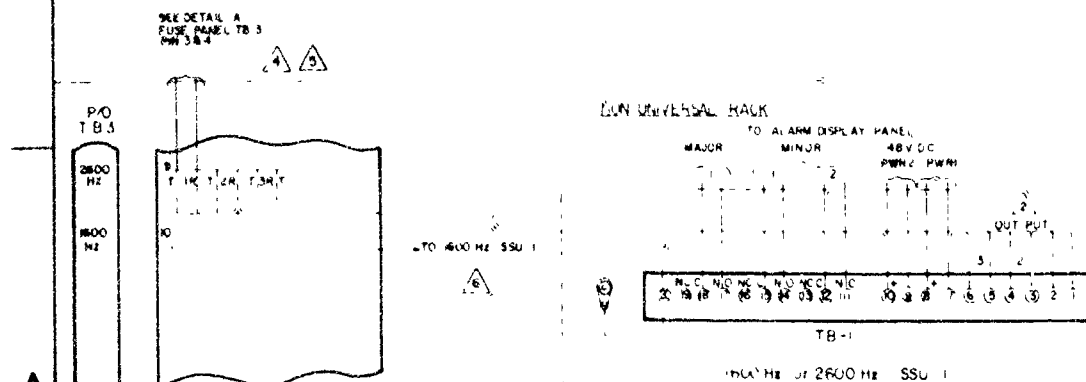
REVISIONS				
SYN	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISION, SHEET NUMBER WAS 3 OF 5	2 NOV 78	<i>Gal</i>



ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
ORGANIZATION: USACEEIA-CED				
EQUIPMENT INTERFACE WIRING				
DESIGN BY: J. RAMEY				
DRAFTSMAN: J. WREN				
CHECKER: J. CLARK				
DATE: 21 APR 76				
ORGANIZATION: <i>USACEEIA-CED</i>				
APPROVAL:	CODE IDENT NO: 50470	DATE: D	COM-TC03-120	
	SCALE: NONE		SHEET 1 OF 3	



DETAIL A



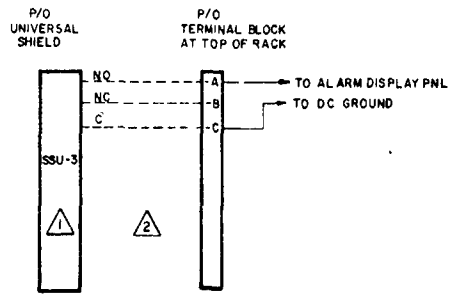
DETAIL B

1. UNIVERSAL NO SUPPLY UN  
PART IN THE UNIVERSAL  
DL 4 ARE USED FOR RED
2. HALL ARE RECEIVED FROM  
BY THE PROCUREMENT CONT
3. IN THE DE RESERVE IN  
A THE TOP OF BAY
4. C LAD STU MAY BE O
5. HALL 2 PPT ARE AVAIL  
PART. A RED RED
6. HALL 2 DL 3 WIRE, SAN
7. HALL 3 PPT FROM HIGER  
HALL 3 BY THE CONT.

5 4 3 2 1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		MINOR REVISION, SHEET NUMBER WAS 2 OF 3	2 NOV 78	

OF  
RACK  
7-12



LCE UNIVERSAL RACK WIRING & INSTALLERS CONNECTORS.

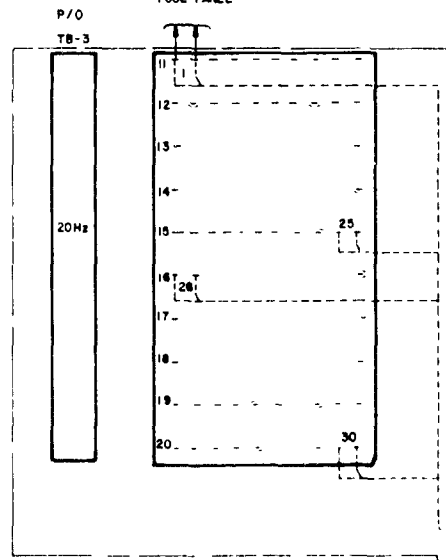
TABLE

IN	OUT	IN	OUT
1	1	4	4
2	2	5	5
3	3	6	6

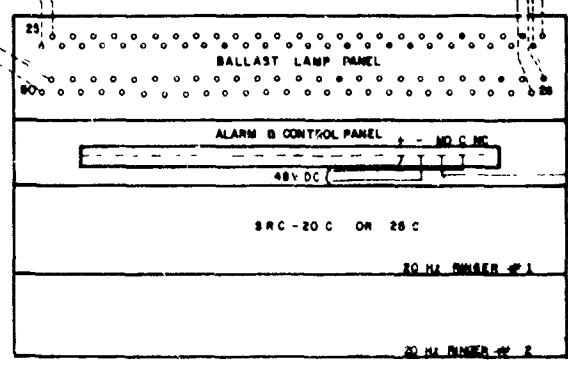
DISTRIBUTION  
FRAME  
TB

SEE DETAIL "A"

TO PIN 4 & 6  
OF TB 4  
FUSE PANEL



NON-UNIVERSAL RACK WIRING & INSTALLERS CONNECTIONS  
20 Hz RINGING SIGNAL



THE SIGNALING SUPPLY UNIT SSU-3 MAY BE PLUGGED INTO ANY MODULE  
SPACE IN THE UNIVERSAL RACK. TWO SSU-3 MAY BE SUPPLIED FROM ONE SSU. TWO  
SSU-3 ARE USED FOR REDUNDANCY.

BALLASTS ARE RECEIVED FROM CONTRACTOR WITH WIRING COMPLETED AS SPECIFIED  
BY THE PROCUREMENT CONTRACT.

THIS BRIDGE REQUIRE THREE MODULE SPACES AND THREE ROWS OF PINS ON TERMINAL  
BLOCK AT THE TOP OF EACH OF THE UNIVERSAL RACK.

UP TO 240 VDC MAY BE OPERATED FROM EACH 20

THREE OUTPUTS ARE AVAILABLE MULTIPLE TO OTHER FUSE  
PANEL A. WIRE RED.

1600 Hz SSU-3 WIRE SAME AS USING PIN ROW 10 OF TB-3

RACK SHIPPED FROM MFG W/ WIRING AND EQUIPPED WITH SHELF AT  
SPECIFIED BY THE CONTRACT.

ITEM	DESCRIPTION	FSN	UI	QTY
LIST OF MATERIALS				
DESIGN BY J. RAMEY		ORGANIZATION USACEEIA-CED		
DRAFTSMAN L. KALFMAN		PORT HUACHUCA, ARIZONA		
CHECKER A. J. JONES		EQUIPMENT INTERFACE WIRING		
DATE 17 MAR 76				
ORGANIZATION APPROVAL		CODE IDENT. NO.	DATE	
		50470	D	COM-TC03-120

1 October 1979

SEIP 006

## SECTION 5. BILL OF MATERIALS

5.1 GENERAL. This section identifies the items of equipment and materials necessary to install a technical control facility. The items identified are intended as a guide for preparing an EIP. Items may be added or deleted to meet the requirements of a specific installation project. The BOM is prepared on DA Form 3071-R which identifies the project number, location code, unit identification code, drawing list number, and project material and equipment requirements.

5.2 MAJOR ITEMS. The major items are listed on DA Form 3071-R, Bill of Materials, shown in figure 5-1. The authorized equipment list (AEL) identification and NSN are provided when available. When these numbers are not available, the nomenclature will include the manufacturer's part number. Major items will be entered first, as a rule, and will be the BOM items that will become accountable by the O&M command. An exception to this rule is when a major or accountable item is identified after the BOM has been compiled and, in some cases, issued. The major item identified after completion of the BOM will be on a separate sheet and contain a revision number and pertinent data. Technical manuals, or manufacturer's manuals if technical manuals are not available, will be provided as part of the major end item.

5.3 GOVERNMENT-FURNISHED EQUIPMENT. Government-furnished equipment (GFE) will be identified by one of the following examples:

5.3.1 GFE presently located onsite and which is to be reused as stated in the site package C-E plan will be shown and identified on the elevation drawings only and will not appear on the BOM. The identification on the drawings will be alphabetically, whereas BOM items will be listed numerically.

5.3.2 GFE to be shipped to the site or being obtained from other assets will be numerically identified on the BOM and the drawing with a note on the supplementary sheet of the BOM identifying the source of the GFE.

5.4 LONG LEAD-TIME ITEMS. Long lead-time items will be identified on the BOM to the maximum extent possible by the detail engineer. The designations on the BOM will be by an asterisk (\*) with a note explaining the use of the asterisk.

5.5 PRECEDENCE OF BILL OF MATERIALS. Although the site package C-E plan will identify major and/or long lead-time items, this document is preliminary to the detail engineering; therefore, items appearing



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on a BOM will take precedence over the C-E plan. The cover letter forwarding the BOM to the procuring activity will contain a statement requesting prior coordination with the detail engineer before items are substituted.

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				
Per use of this form, use AR 105-22 the present agency is the United States Army Communications Command				
UNIT IDENT CODE				
LOCATION		UNIT IDENT CODE		
TELER NUMBER		DATE	PAGE NO.	NO OF PAGES
ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT
1	NSMR 173494N	Status Reporting Console	ea	
2	NSMC 2362R	Circuit Concentration Frame Bay	ea	
3	NSMP 2796N	Panel, Patch Coaxial, Wideband	ea	
4	NSMP 2564E	Vf Patch Panel	ea	
5	5915-00-937-2041 '2324N	Teletypewriter Set, AN/UGC-61Y	ea	
6	NSMC 2470N	Interbay Patch Panel	ea	
7	NSMP 23249F	Miscellaneous Patch Panel	ea	
8	NSMP 13750M	48V Dc Power Supply	ea	
9	NSMC 118812B	Dc Patch Panel, Low Level Transmit *Receive side 80M item # 183	ea	
10	NSMP 22251N	Power Distribution Bay	ea	
11	6625-00-421-7380 '1766	Voltmeter, Electronic, Type MF-302/Al	ea	
12	6625-00-464-1702 '0629N	Test Set, Teletypewriter, AN/GGN-15 V1	ea	
13	NSMP 23252K	Fuse Panel 135C 6V	ea	
14	NSMR 113601Z	48 Lamp Interbay Patch Panel	ea	
15	5975-00-937-4582 (008-97	Panel, Blank, Alum 19 in x 1 3/4 in x 1/8 in	ea	

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Figure 5-1. Sample bill of materials (sheet 1 of 15).

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LOCATION		TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		UNIT IDENT CODE	
PER USE OF THIS FORM, SEE AR 108-72. THE PREPARING AGENCY IS THE UNITED STATES ARMY COMMUNICATIONS COMMAND					
TELER NUMBER		NOMENCLATURE		DATE	PAGE NO. NO. OF PAGES
ITEM NO	STOCK NUMBER			UNIT	TOTAL AVAILABLE REQ FOR IN PROJECT COMMAND REQUIRED
16	5820-00-170-4567 (09026N)	Panel, Blank, Alum 19 x 5.219 x .18"		e3	
17	5975-00-937-4561 (10533F)	Panel, Blank, Alum, 19 x 9 3/4 x 1/8 in		e2	
18	NSNR (22040H)	Panel, AC Receptical Assembly SAAC-C-40014		e3	
19	NSNR (22040H)	Panel, Warning EMCOR 00-134		e2	
20	NSNR (22040H)	Panel, Warning EMCOR 00-134		e2	
21	5975-00-937-4561 (09298C)	Power Supply, TELESIG 5763		e2	
22	NSNR (19364P)	Multimeter, Digital, DIGITEC PIN 269		e2	
23	5975-00-937-4561 (09298C)	Panel, Blank, Alum 19 x 5.219 x .18"		e2	
24	NSNR (22040H)	Equipment Rack, Testing		e3	
25	5975-00-934-4566 (02451K)	Panel, Blank, 19 x 10 1/2 x 1/8 in		e2	
26	5975-00-686-2541 (08712Z)	Panel, Blank, 19 x 3 1/2 x 1/8 in		e2	
27	NSNR (22151L)	Alarm Display Panel		e2	
28	5920-00-801-8014 (01813W)	Fuse Panel, SB1523/ft		e2	
29	6625-00-727-4706 (12987G)	Multimeter, Electronic, Type AN/USM-224		e2	

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Figure 5-1. Sample bill of materials (sheet 2 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
Per use of this form, see DA Form 3071-1, 1 AUG 72 and subsequent agency in the United States Army Communications Command				DATE	PAGE NO
LOCATION	TELETYPE NUMBER	WOMENCLATURE	UNIT	TOTAL AVAILABLE REQ FOR IN PROJECT COMMAND	NO OF PAGES
1	6021-00-20-7496	Test Set Noise Level, TS-3171/U	ea		
2	6021-00-20-7389	Impulse Noise Measuring Set, TS-58AF	ea		
3	6021-00-20-4699	Generator Signal, P12858	ea		
4	6021-00-20-7350	Counter, Electron Beam 1000 Measuring System	ea		
5	6021-00-20-7226	Phase Meter ME 490 U, Helimlar	ea		
6	6021-00-20-455-0527	Voltmeter, Frequency Selective, HP-3591A	ea		
7	6021-00-20-7308	Test Set, TS-2669A	ea		
8	6021-00-20-464-7057	Recorder, R0460 V1	ea		
9	6021-00-20-464-7057	Oscilloscope, Type AN/USM-281	ea		
10	6021-00-20-464-7057	Recorder, R0 458 V2	ea		
11	6021-00-20-241-3032	Transmission Measuring Set, HP-3550B	ea		
12	6021-00-20-167-9861	Bridge ZM 74U	ea		

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Figure 5-1. Sample bill of materials (sheet 3 of 15).

TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, use AN 107-22 (no subsequent agency in the United States Army Communications Command)									
LOCATION		UNIT IDENT CODE							
VEHICLE NUMBER		DATE		PAGE NO		NO OF PAGES			
ITEM NO	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL AVAILABLE REQ FOR PROJECT COMMAND	REQUIRED			
1	5501-U-070-063	Telephone Pulse Signaling Test Set W/1111 TTS-26-B-10		02					
2	NSN 23267	DC High Level Patch Panel, Transmit Assembly		02					
3	NSN 23260N1	Receive side BOW item #194		02					
4	NSN 23260N1	Fuse Panel		02					
5	NSN 23260N1	Power Supply TELECOM 1000		02					
6	NSN 23259	Digital Line Interfacing Unit		02					
7	NSN 23260N1	Panel, Resistance Control, SB-1642G		02					
8	NSN 23261M	Fuse Panel SB-3751/ES P/O Order Wire		02					
9	NSN 23260N1	Shelf, MTC, Vertical Power Module 4110		02					
10	NSN 23260N1	Printed Circuit Card Rack Assembly, 10 9740		02					
11	NSN 23260N1	Speaker Assembly 6501-3870		02					
12	NSN 23260N1	Equipment Rack F100-10		02					
13	NSN 23260N1	Work/Writing Top OP-145		02					
14	NSN 23260N1	Equipment Rack F400-15		02					
15	NSN 23260N1	Side Panel Sloping Front F400-21 PH		02					
16	NSN 23260N1	Side Panel Plain Back Corner F100-25		02					

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EDITION OF 1 AUG 73 IS OBSOLETE

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Figure 5-1. Sample bill of materials (sheet 4 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				
Per use of this form, see AR 105-27, the proponent agency is the United States Army Communications Command				
LOCATION		UNIT IDENT CODE		
TITLE NUMBER		DATE	PAGE NO	NO OF PAGES
ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL AVAILABLE REQ FOR PROJECT COMMAND
1	NSM 33270	Blank Panel P21	ea	
2	NSM 33274	Blank Panel P.5	ea	
3	NSM 33273	Sliding Drawer w/left top L70-1915	ea	
4	NSM 33274	Equipment Drawer ED 1000-3-18	ea	
5	NSM 33275	Equipment Drawer ED 1000-2-16	ea	
6	NSM 33276	Plug Mold 320050	ea	
7	NSM 33277	DELETED, Manufacturer's discontinued item	ea	
8	NSM 33278	Straight Box Container 5003	ea	
9	NSM 33279	Screw Panel 32 Self-latching for 1/2" x 1/2"	ea	
10	NSM 33280	Aluminum 2" x 2" x 2"	ea	
11	NSM 33281	Screw, Machine, Hex head 1/4-20 x 3/4"	ea	
12	NSM 33282	Plug Mold 20 DC 106 1 1/2" 1 1/2"	ea	
13	NSM 33283	Conduit, Flexible 3/4"	ea	
14	NSM 33284	Metering Panel #310 Mor	ea	
15	NSM 33285	Washer, flat, 3/8", 07141A031	ea	
16	NSM 33286	Expansion Anchor 3/8"-16 x 1 7/16" 97051A031	ea	

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Figure 5-1. Sample bill of materials (sheet 5 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
Per use of this form, use AN 100-22 and predecessor agency to the United States Army Communications Command				DATE	PAGE NO
LOCATION				NO OF PAGES	
ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND
1	ANW 756	Lug Screw 3/8" x 1 1/4" 91478DK26	hd		
2	ANW 757	Flat Corner Brace 3" x 3" x 3/4" 1556A1E	ea		
3	ANW 758	Flat Corner Brace 6" x 6" x 1 1/4" 1556A1G	ea		
4	ANW 759	Bolt, Hex Head 3/8"-16 x 1 1/4" w/nut 91469A626	hd		
5	ANW 760	Drop-in Grid Support Mark 12	ea		
6	ANW 761	Pedestal Assembly Mark 12	ea		
7	ANW 762	Plate 24 x 24 Mark 12	ea		
8	ANW 763	Corner Clamp P-403473	ea		
9	ANW 764	Cable Rack 20" P-401703	ea		
10	ANW 765	Clamp, Strapped P-403472	ea		
11	ANW 766	Bolt 3/8-16 x 2 9/16" P-403472	hd		
12	ANW 767	Nut Hex 3/8 P-401452	hd		
13	ANW 768	Bolt 3/8-16 x 1 11/16 P-403472	hd		
14	ANW 769	Edge Clamp P-403475	ea		
15	ANW 770	Edge Clamp P-403477	ea		

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Figure 5-1. Sample bill of materials (sheet 6 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see AR 100-72, the predecessor agency is the United States Army Communications Command									
UNIT IDENT CODE									
TELE NUMBER		DATE		PAGE NO. NO OF PAGES					
ITEM NO.	STOCK NUMBER	NOMENCLATURE			UNIT	TOTAL REQ FOR PROJECT COMMAND	AVAILABLE IN PROJECT COMMAND	REQUIRED	
8	NSNF 495	Bolt 3/8-16 x 2 15/16 P-403466			hd				
9	NSNF 496	Foot P-401751			ea				
10	NSNF 497	Power Monitor Panel SAAD-D-40599			ea				
11	NSNF 498	Panel, Ac Power QO-430-40			ea				
12	NSNF 499	Power Duct 4" x 4" LD-411M 1 ft 1g			ea				
13	NSNF 500	Power Duct Elbow LD-498H			ea				
14	NSNF 501	Snap Strap, F1 x Condu++ 4160			ee				
15	NSNF 502	Screw Machine, PH 8-32 x 1/2" 90283A194			hd				
16	NSNF 503	Nut Hex 8-32 93435A194			hd				
17	NSNF 504	Power Duct 4" x 4" x 10' LD-410MA			ea				
18	NSNF 505	Panel, Connector 4" LD-44A			ea				
19	NSNF 506	TEE Power Duct LD-41			ea				
20	NSNF 507	Bolt, "J" 1/2-13 P422023			ea				
21	NSNF 508	Aluminum Channel 1 1/2" x 1/2" x 1/2" x 1/8"			ft				
22	NSNF 509	Aluminum Channel 1 3/4" x 1/2" x 1/2" x 1/8"			ft				
23	NSNF 510	Bolt, flat head 1/4-20 x 1" 90232A542			hd				
24	NSNF 511	*DELETED SAME AS ITEM # 79							

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Figure 5-1. Sample bill of materials (sheet 7 of 15).



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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
For use of this form, see AIR 108-22, the predecessor agency to the United States Army Communications Command									
LOCATION		UNIT IDENT CODE							
TELE NUMBER		DATE		PAGE NO.		NO OF PAGES			
ITEM NO	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED		
101	NSNR 91509C	Machine Screw, PH 10-24 x 1/2" 90283A24Z		hd					
102	NSNF 91510F	Nut, Hex 10-24 90480A011		hd					
103	NSNP 91511D	Washer, flat #10 92917A135		hd					
104	NSNF 91512	Hinged Connector LDAC		ea					
105	NSNP 91513F	Nut, Hex 5/8-11 P2052E1		hd					
106	NSNP 91514G	Washer, Flat 5/8" 93490DC35		hd					
107	NSNF 91515H	Washer, lock 5/8" 93496DC35		hd					
108	NSNR 12316M	Channel, Rack Support 2' x 9/16" x 9/16"		ea					
109	NSNP 91517Z	Clip, 3/8 rod P-258449		ea					
110	NSNF 91518	Threaded Rod 5/8-11		ea					
111	NSNF 91519	Threaded Rod 3/8-16		ea					
112	NSNP 91520B	Clip, 5/8 rod P-453275		ea					
113	NSNP 91521	Ground Box Assembly		ea					
114	NSNF 91520B	Screw, Machine, RH w/nut 3/8-16 x 3/4" 90232DC22		hd					
115	NSNR 91521C	Lock Screw 3/8" D x 2 1/4" 91477A634		ea					
116	NSNF 91521C	Lock Wash, External Tooth 91114A031		hd					
117	NSNR 91523E	5/8 Lockin Expansion Shield P409044		hd					

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Figure 5-1. Sample bill of materials (sheet 8 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see AR 105-27, the predecessor agency is the United States Army Communications Center and.									
UNIT IDENT CODE									
TELER NUMBER		STOCK NUMBER		NOMENCLATURE		DATE		PAGE NO. NO. OF PAGES	
ITEM NO.						UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
1	NSMR 33524	1/2" x 1/4" Clip for 5/8" Rod P400298	ea						
2	NSMR 33525C	Wire, Stranded Tinned Copper, 16 GA, 26/30 Strand .125 dia, #3077-1, white	ft						
3	NSMR 33527W	Wire, Stranded Tinned Copper, 16 GA, 26/30 Strand .125 dia, #3077-2, Black	ft						
4	NSMR 33528	Wire, Stranded Tinned Copper, 16 GA, 26/30 Strand .125 dia, #3077-4, Green	ft						
5	NSMR 33529	Shrinkable tubing, FET-10F-1/4 Polyvinyl chloride (Bleach Conformed to MIL-I-6310	ft						
6	NSMR 33530	Solder, Resin Core, Kester #44, 1 lb spool, Alloy 60/40, dia .002	ft						
7	NSMR 33531	Relay Rack, Standard 23", 7'-6" high Part #4124-011	ea						
8	NSMR 33532	Screw, Machine, PH, Steel, Cap plated, 1/2" x 5/16"	hr						
9	NSMR 33533D	TEE, Malleable Iron, Pipe Size 2"	ea						
10	NSMR 33534E	Elbow, 90 degrees, Malleable Iron Pipe Size 2"	ea						
11	NSMR 33535	Box Connector, Straight Squeeze type, Trade size 2	ea						
12	NSMR 33536G	Flexible Steel Conduit, Trade size 2"	ft						
13	NSMR 33537H	Wire, 10 GA, Type-TV, 600 V, Copper, PVC insulation, 7 strands, Red	ft						

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EDITION OF 1 AUG 72 IS OBSOLETE

Figure 5-1. Sample bill of materials (sheet 9 of 15).

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LOCATION		TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		UNIT IDENT CODE	
Per use of this form, see AR 160-22, the proponent agency is the United States Army Communications Command					
ITEM NO	STOCK NUMBER	NOMENCLATURE	DATE	PAGE NO.	NO OF PAGES
TELER NUMBER			UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND
137	NSMR 22038W	Wire, 10 GA, Type-TM, 600 V, Copper, PVC insulation, 7 strands, color-blue	ft		
138	NSMR 22039W	Wire, 10 GA, Type-TM, 600 V, Copper, PVC insulation, 7 strands, color-black	ft		
139	NSMR 22040W	Wire, 8 GA, Type-TM, 600 V, Copper, PVC insulation, 7 strands, color-green	ft		
140	NSMR 22041W	Wire Stranded Tinned, Copper 18 GA, 16/30 Strands #3075-1, White	ft		
141	NSMR 22042W	Bakelite Insulating Bushing, Conduit Type A, 2" Part #A200	ea		
142	NSMR 22043C	Locknut, Steel, size 2" T&B #146	ea		
143	NSMR 22044D	Nipple, Close Type, Size 2", Steel	ea		
144	NSMR 22045E	Sheathed Cable, Black, white, green, non-metallic type-NM, #12 AWG, 2" for w/ground, copper	ft		
145	NSMR 22046F	Conduit, Flexible Steel, 1/2" size	ft		
146	NSMR 22047G	Box Connector, Straight Squeeze Type, 1/2" Size T&B 254	ea		
147	NSMR 22048H	Screw, PH, Type-B Self-tapping #6-3/8" x MJ-246J	ea		
148	NSMR 22049W	Washer, External Tooth, #6 MS-3533	ea		
149	NSMR 22050J	Spacer, Terminal w/flange w/te, size 12, #6 stud size	ea		
150	NSMR 22051Z	Side Panel Sloping Front, S 400-12LH	ea		

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Figure 5-1. Sample bill of materials (sheet 10 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS		UNIT IDENT CODE	
Per use of this form, see AR 105-22 the proponent agency is the United States Army Communications Command		DATE	PAGE NO. NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT
14	5010-01-139-754A 06766	Washer, flat, 1/4" ID, Steel Cad Plated	hd
15	5010-01-95-166 00550	Nut, hex, 1/4-20 UNC, Steel Cad Plated	hd
16	5975-01-57-0843 035	Power Panel Cover, 00C305	ea
17	5025-01-02-6010 0244	Power Panel, Ground Bar Int, #PK236TA	ea
18	5025-01-15-4610 0204018	Circuit Breaker, Air Arch Quenching, SPST 120/240 Vac	ea
19	NSNP 00556E1	Adjustable Bean Clamp for 1/2" Rod, E-160-1/2	ea
20	NSNP 00557F1	Threaded Rod, Steel, 1/2-13 UNC, 6' lg	ea
21	NSNP 5584	Beam Clamp, Series 500, #503, tapped for 1/2-13 rod	ea
22	NSNP 5591	Plug mold w/cover, G-30019, 10' lg	ea
23	NSNP 5601	Wire, Clip #G-3000MC	ea
24	NSNP 5610	Cover, Clip #G-3006	ea
25	NSNP 5617	Blank End Fitting, #G-3010B	ea
26	NSNP 563A1	Receptable, Duplex w/cover, #G-3043C	ea
27	5805-01-139-0476 1235415	Ballast Lamp Panel, Model RLF-508, 60 Vdc, Positive, #9023-1003-002	ea
28	5970-12-1355 1195101	Shrinkable Tubing FIT-105-1-1/2 Black	ft

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Figure 5-1. Sample bill of materials (sheet 11 of 15).

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TELECOMMUNICATIONS		UNIT IDENT CODE	
Per use of this form, see AR 106-22, this page		ENT PROJECT - BILL OF MATERIALS	
LOCATION		UNIT IDENT CODE	
TELEPHONE NUMBER		DATE	
STOCK NUMBER		PAGE NO. NO. OF PAGES	
ITEM NO.	STOCK NUMBER	UNIT	TOTAL REQ FOR PROJECT COMMAND
14	5935-01-114 b 1 (222)	ea	
16	5935-01-95-01-01 (222)	ea	
10	NSMR 503F	ea	
10	6145-1-91-01-01 (330)	ea	
	Connector Shield-KOM ESC-156	ea	
169	5940-00-247-2686 (222)	ea	
170	NSMR 9117	ea	
	Cable, 76 pr, Individual shielded pair	ea	
	Heat Shrinkable Tubing E-100-110-110	ea	
	Generator, Signal SG 74710	ea	
171	NSMR 1120	ea	
	Dc Patch Panel, Low Level Receive	ea	
172	NSMR 50	ea	
	Dc High Level Patch Panel, Receive	ea	
173	5625-10-10-40 (176)	ea	
	Counter Module Univers... of 5307A	ea	
174	5975-14-14-14 (08)	ea	
	Plate, Colting LOMCP	ea	

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Figure 5-1. Sample bill of materials (sheet 12 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
For use of this form, see AR 165-1-1, The Department Agency is the United States Army Communications Command.				DATE	PAGE NO. NO. OF PAGES
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND REQUIRED
175	975-00-673-761-1440/H	Fitting, End 2010A	ea		
176	NSNR 24670K	Floor Panel, Mark 20, 24" sq	ea		
177	NSNR 24670K	Step Panel, Mark 20	ea		
178	NSNR 24670K	4-Way Pedestal, Mark 20	ea		
179	NSNR 24670K	3-Way Pedestal, Mark 20	ea		
180	NSNR 24670K	L/A Nut Assembly, Mark 20	ea		
181	NSNR 24670K	Angle, Alum, 1 1/4" x 1 1/4" x 1/8"	ft		
182	NSNR 24670K	Closure Plate, Fluted, 18", Raised Floor	ft		
183	NSNP 24670K	"A" Stringer, Mark 20, 6 Ft	ea		
184	NSNP 24670K	"A" Stringer, Mark 20, 2 Ft	ea		
185	NSNP 24670K	"B" Stringer, Mark 20, 2 Ft	ea		
186	NSNP 24670K	Adhesive	gal		
187	NSNP 24670K	Fascia Stringer w/Vinly Insert	ft		
188	NSNP 24670K	Ramp Panels, 24" x 24" sq, Mark 20	ea		
189	NSNP 24670K	Aluminum Ramp Shoe, 48" sq	ea		
190	NSNP 24670K	Beveled Pedestal Cap	ea		
191	NSNP 24670K	Pedestal Base, Beveled Pedestal Cap	ea		

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Figure 5-1. Sample bill of materials (sheet 13 of 15).

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LOCATION		TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS				UNIT IDENT CODE	
Per use of this form, see AR 100-22. The proponent agency is the United States Army Communications Command		DATE		PAGE NO. NO. OF PAGES			
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT COMMAND	AVAILABLE IN PROJECT COMMAND	REQUIRED	
100	NSM 306-06-39-377	Angle Clip, Ramp	ea				
101	NSM 306-06-39-377	Bolt, HH, 3/8-16 x 2 1/2	pg				
106	NSM 306-06-39-377	Nut, Spring 3/8-16 UNISTRUT P1008	ea				
107	NSM 306-06-39-377	Bolt, HH, 3/8-16 x 3/4 H37HMS0975EG	ea				
108	NSM 306-06-39-377	Tubular Knee Brace, UNISTRUT P2458-15	ea				
109	NSM 306-06-39-377	Fitting, Flat Plate, UNISTRUT A1063	ea				
110	NSM 306-06-39-377	Fitting, Flat Plate, UNISTRUT A1331	ea				
111	NSM 306-06-39-377	Fitting, Flat Plate, UNISTRUT A1332	ea				
112	NSM 306-06-39-377	Bolt, HH, 3/8-16 x 1/2	ea				
113	NSM 306-06-39-377	Channel, UNISTRUT 1 5/8 x 3 1/2 x 106 P1000	ea				
114	NSM 306-06-39-377	Channel, UNISTRUT 1 5/8 x 3 1/2 x 106 P1000T	ea				
115	NSM 306-06-39-377	Nut, Square 3/8-16	ea				
116	NSM 306-06-39-377	Fitting, Wing Shaped Unistrut P226	ea				
117	NSM 306-06-39-377	Channel, UNISTRUT 1 5/8 x 3 1/2 x 20 P4500	ea				
118	NSM 306-06-39-377	Pipe Clamp, 1" (typical) UNISTRUT C-1	ea				

EDITION OF 1 AUG 72 IS OBSOLETE

DA FORM 3071-1

Figure 5-1. Sample bill of materials (sheet 14 of 15).

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TELECOMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS									
Per use of this form, see AR 105-22, the predecessor agency is the United States Army Communications Command									
LOCATION		UNIT IDENT CODE							
TELE NUMBER		DATE		PAGE NO.		NO. OF PAGES			
ITEM NO	STOCK NUMBER	NOMENCLATURE		UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED		
204	5305-00-019-074	Screw, HH, 3/8-16 x 1 1/2		hd					
205	0510-00-017-94	Washer, Lock 3/8		ea					
211	NONE 168E	Cross Angle, 1" x 1" x 77" PMA-78A		ea					
212	5305-00-017-224	Screw, HH, 1/4-20 x 1 1/2 MS2725-12		ea					
213	NONE 667	Nut, w/Spring 3/8-16 UNISTRUT P5503		ea					
214	NONE (23265J)	Baseboard, Vinyl 2 1/2" x 4" 37K1411A		ea					
215	NONE 25264K	Washer, Flat 1/4 MS27183-2		ea					
216	5310-00-02-5965	Washer, Lock 1/4 MS3533-12		ea					
217	NONE 37A	Expansion Shield, 1/4 x 1/2 x 1/32 97052A209		ea					
218	NONE 12637	Fitting, Flat Plate 1/8 x 1/2 x 2 15/16 UNISTRUT P6037		ea					
219	NONE 62W	Fitting, Flat Plate 1/8 x 1/2 x 1 7/8 UNISTRUT P6038		ea					
220	5305-00-018-050	Screw, HH, 1/4-20 x 1/2 MS25307-303		ea					
221	5305-00-018-050	Nut Plain Hex 1/4-20		hd					

EDITION OF 1 AUG 72 IS OBSOLETE

DA FORM 3071-R  
1 APR 78

Figure 5-1. Sample bill of materials (sheet 15 of 15).



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SEIP 006

## SECTION 6. QUALITY ASSURANCE PROCEDURES

6.1 GENERAL. The quality assurance program for the (applicable site) technical control facility defined in the preceding sections of this EIP has been developed in accordance with the provisions and criteria of Chapter 5, CCR 702-1-2 (para 6.2a). The QA program is to be implemented in accordance with this and the following two sections and will provide the assurance to all concerned that the specified equipment and facilities have been installed in accordance with the requirements and criteria of this EIP and are acceptable for turnover to and use by the operating agency. The requirements and criteria specified here and in sections 7 and 8 constitute the quality assurance plan for the specified (applicable site) technical control facility.

### 6.2 QUALITY ASSURANCE PROGRAM.

6.2.1 Planning and functions. The QA program defined herein consists of a planned and systematic approach for assessing the quality, during the installation and acceptance testing, of project implementation and correcting at the earliest time any discrepancies, deficiencies, or shortcomings revealed through inspection and test efforts. The QA and quality control (QC) planning and functions will begin at the earliest stages of project implementation and end only after all possible corrective action efforts are completed and the (applicable site) technical control facility is released to the operating or user agency. QA and QC functions are to be performed by personnel operating independently from those charged with the engineering of the installation or involved in the process of installing the (applicable site) technical control facility. Under the program, these functions are divided among three participating organizations: (1) the test agency, (2) the installation agency, and (3) the operating agency.

6.2.2 Test agency. As the manager and implementer of the QA program and acceptance testing efforts for the (applicable site) technical control facility, the test agency will commence project planning as soon as tasked. The test agency QA representative/test director is responsible for periodic in-process QA checks, final QA inspections, and acceptance tests in accordance with management provisions of CCCR 702-3 (para 6.2d) and this EIP. QA inspections will be performed at the discretion of this Agency for the purpose of assessing the effectiveness of the QC effort by the installation agency; initiating corrective actions thereto, as appropriate; and determining the extent to which the installation effort adheres to the requisite quality requirements. Acceptance testing is conducted in accordance with section 7 and for the purpose of determining if the installed (applicable site) technical control facility complies with the

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technical requirements of this EIP and to ensure that the (applicable site) technical control facility is suitable for the intended application. At the earliest stages of project initiation, the test agency is to identify a QA representative/test director. For project continuity and effective management, a single individual should be assigned both roles. This will assure that the QA and test efforts are fully integrated and the following actions are expeditiously accomplished in the following manner and sequence:

a. Implement the QA concepts and requirements identified herein. Participate in the development of individual EIP's incorporating site particular requirements therein.

b. Assure that the participating elements and organizations are thoroughly familiar with their respective roles in support of QA, QC, and testing and have been properly tasked.

c. Validate, through the use of project oriented reports, formal and informal contacts, project status reviews, onsite inspections, etc., the quality control and installation efforts to assure compliance with the stated requirements and criteria of this EIP. When an inadequacy is found to exist in the installation agency QC effort, the procedures of CCCR 702-7 (para 6.2f) will be applied. Monitor and assess follow-up actions and bring to the attention of higher authority those discrepancies or differences which can not be resolved at this level or in a timely manner.

d. Facilitate responsibilities by identifying and recording this information and data as required by USACEEIA Form 113-R, Cognizant Agency, Command and Facility Points of Contact (fig. 6-1). This form becomes a part of the project files and will be updated as necessary to assure orderly project execution. The dissemination of this information with the participants in the QA program is encouraged.

e. Perform a final QA inspection using USACEEIA Form 112-R (fig. 6-2), tailored to the specifics of this effort. When the installation effort and checkout of the (applicable site) technical control facility have been completed, this EIP and Air Force Technical Order (AFTO) series) shall be the evaluation criteria for the site inspection efforts. This inspection will consist of thorough visual and mechanical observations of the installed materiel, QC records, onsite inspection, and other factors to evaluate the quality of the work performed and its acceptability.

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COGNIZANT AGENCY, COMMAND, AND FACILITY QA POINTS OF CONTACT 100CR 100-2					
	<u>Individual POC</u>	<u>Bldg. No.</u>	<u>Rm. No.</u>	<u>Phone No.</u>	<u>Name of Agency</u>
<u>Installation:</u>					
Team Leader	_____	_____	_____	_____	_____
Assistant Team Leader	_____	_____	_____	_____	_____
Quality Control	_____	_____	_____	_____	_____
<u>Quality Assurance Agency:</u>					
Representative	_____	_____	_____	_____	_____
Testing Activity	_____	_____	_____	_____	_____
<u>Operating Agency:</u>					
Representative	_____	_____	_____	_____	_____
Site Commander	_____	_____	_____	_____	_____

100CR 100-2  
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Figure 6-1. Sample form of cognizant agency, command, and facility QA points of contact.

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QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 1 OF 11 PAGES	
SITE		DATE (Day, Mo, Year)	
LOCATION			
PROJECT NAME		TASK NO.	
REFERENCED T.O. FOR QUALITY OBSERVATIONS FOLLOW MAIN PARAGRAPHS			
<p>4. Drawings and specifications (AFIO 31-10-3, 31-10-4, 31-10-5, 31-10-6, 31-10-7, 31-10-8, 31-10-9)</p> <p>1. Are floor plan drawings available?</p> <p>2. Are equipment location drawings available?</p> <p>3. Are face layout drawings of equipment in bays available?</p> <p>4. Are drawings for distribution frame bays available?</p> <p>5. Are pin connections on terminal blocks shown on drawings?</p> <p>6. Is stenciling of terminal blocks shown on drawings?</p> <p>7. Are drawings of power distribution equipment available?</p> <p>8. Are wire sizes indicated on drawings?</p> <p>9. Are schematic diagrams of circuit types to be installed included in drawings?</p> <p>10. Are drawings of site grounding systems available?</p> <p>11. Are drawings showing arrangement of cable racks, racks, and trenches available?</p> <p>12. Do specifications contain list of reference materials required by installers?</p> <p>13. Are drawings of cable racks, racks, and trenches available?</p> <p>14. Are drawings of cable racks, racks, and trenches available?</p>		YES	NO

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 1 of 11).

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QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 2 OF 11 PAGES		
		YES	NO	NA
15. Do specifications contain cable running list for RF cabling?				
16. Do specifications contain detailed information on grounding?				
17. Do specifications contain details on all special materials to be installed?				
18. Do drawings reference applicable items on BOM?				
B. <u>Tools and Equipment</u> (AFTO 31-10-24)				
1. Is equipment damaged or unserviceable?				
2. Are all installation materials on hand and serviceable?				
3. Are all tools necessary for completion of the job on hand?				
4. Is all test equipment needed for test and checkout of installation available?				
C. <u>General Safety Practice</u> (AFTO 31-10-29)				
1. Are goggles being worn when drilling and grinding?				
2. Are sharp edges left on frame or duct work?				
3. Are all hand tools properly used?				
4. Are electric power tools properly grounded?				
D. <u>Floor Plan Layout</u> (AFTO 31-10-9, 31-10-29)				
1. Are equipment layout plans in accordance with drawings?				
2. Was layout plan completed before equipment was				
E. <u>Structuring and Mounting</u> (AFTO 31-10-29)				
1. Are structural members in accordance with				
2. Are structural members in accordance with				

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 2 of 11).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 3 OF 11 PAGES		
		YES	NO	NA
2.	Are equipment base levels and plumb within tolerances?			
3.	Has proper spacing been provided between equipment racks?			
4.	Are base angles of frames secured to floor in proper location?			
5.	Are all cabinet doors latched and plumb?			
6.	Has finish of equipment, cabinets, and racks been touched up?			
7.	Are bolts and screws free from stripped threads and defaced heads?			
8.	Have sufficient clearances been provided between apparatus for heat dissipation?			
9.	Are terminal blocks aligned on distribution frames?			
10.	Has equipment been installed in cabinets or racks in accordance with face layouts?			
11.	Are all nuts and bolts securely tightened?			
12.	Are exposed or cut ends of metal finish smooth and painted?			
13.	Have lock and flat washers been used?			
14.	Is the C-E equipment BOM available at the facility?			
15.	Has the C-E equipment been inventoried and discrepancies posted?			
16.	Is all required C-E equipment at the site?			
17.	Is all C-E equipment installed?			
F. Cable Racks (AFTO 32-10-6)				
1. Installation of cable racks				
a. Are all racks aligned to design?				
b. Are all racks secured to design?				

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 3 of 11).

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QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 4 OF 11 PAGES		
		YES	NO	NA
b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?				
c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?				
d. Are cable racks located so cables are not subject to damage or exposure or other undesirable conditions?				
2. Assembly of cable racks:				
a. Are long sections of cable racks used where possible?				
b. Have clamping details been altered other than where necessary to avoid interference?				
c. Are open ends of cable racks properly closed?				
d. Are vertical cable racks properly terminated on floors?				
3. Support of cable racks:				
a. Are cable racks properly supported and fastened?				
b. Are cable racks installed so that no excessive load or binding is imposed on the equipment?				
c. Are horizontal cable racks supported on approximately 5 feet centers but not to exceed 6 feet?				
d. Has support been provided within 3 feet of free end of cable rack?				
Are cable racks braced where necessary to prevent sway?				
u. Running Cable (AFTU 31-12-13)				
Are cables installed in accordance with applicable standards?				
Are cables properly secured on floors?				

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 4 of 11).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 5 OF 11 PAGES		
	YES	NO	NA	
3. Do cables at turns or bends conform to the bending radius and position?				
4. Is protection provided where cable sheaths contact rough or sharp edges or metal?				
5. Are cables which are turned off over a point or sharp corner formed with a 90 degree bend?				
6. Are cables turned off rack horizontally and then up?				
7. Are cables to the distribution frame secured to the vertical side?				
8. Are cables serving the horizontal side of a distribution frame secured to the transverse arms near the vertical upright?				
9. Are cable tags properly prepared and secured with the cable running list?				
10. Are cable tags secured at each end of cable run?				
11. Have cable tags been removed upon completion of verification and termination?				
12. Are cable butts located as near as practical to the point where the first wires turn out?				
13. Are cable butts properly treated?				
14. Is insulation of wires undamaged at butt location?				
15. Are unused and spare wires protected at butt location?				
<p>1. <u>at</u> - AFIO 38-1-1, 31-10-11</p> <p>Is starting stitch properly made and placed?</p> <p>Are there 3 layers of insulation?</p>				

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 5 of 11).



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QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 6 OF 11 PAGES		
		YES	NO	NA
4. Are cables secured at every cable rack cross strip?				
5. When cable butt is between securing devices, are cables secured together with an appropriate stitch?				
6. Are lock stitches properly made and spaced?				
7. Are splices in twine properly made?				
I. <u>Sewed Forms</u> (AFTO 31-10-13)				
1. Is proper size twine used for the diameter of the form?				
2. Are proper number of strands used?				
3. Are stitches properly spaced?				
J. <u>Butting and Stripping</u> (AFTO 31-10-13)				
1. Are proper tools used for butting and stripping of cable?				
2. Are cable butts properly dressed?				
3. Is proper distance maintained from cable butt to fanning strip?				
K. <u>Fanned Forms</u> (AFTO 31-10-21)				
1. Are cables fanned and connected to the left side of vertical mounted terminal blocks and to the bottom of horizontal terminal blocks?				
2. Are conductors in fanned forms twisted and bunched?				
3. Are fanned forms straight and taut from butt location to fanning strip?				
4. Is length of skimmers correct?				
5. Has color code been properly followed?				
6. Are spare wires disposed of properly?				
L. <u>Stenciling</u> (AFTO 31-10-27, 31-10-29)				
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?				

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 6 of 11).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 7 OF 11 PAGES		
		YES	NO	NA
2. Are designations located correctly?				
3. Are correct size designations used on particular types of apparatus or equipment?				
M. <u>Strapping</u> (AFTO 31-10-16)				
1. Are straps properly placed?				
2. Is correct type of strap wire used?				
3. Does insulation extend to terminal?				
4. Are straps placed so as not to interfere with operation of apparatus?				
5. Is removal of apparatus blocked?				
6. Are designations of apparatus obscured?				
N. <u>Connecting and Soldering</u> (AFTO 31-10-7)				
1. Is soldering clamp used when connecting wires?				
2. Are connections made on terminal blocks in proper manner?				
3. Is all soldering done with standard rosin core solder?				
4. Are connections secure and free of foreign substances?				
5. Has all unsightly flux and excess globules of solder been removed?				
6. Is insulation on skimmers burnt or otherwise damaged?				
7. Do skimmers on connected terminals exceed 1/16 in?				
8. Are all conductors given a continuity test after connection is made?				
O. <u>Wrapped Connections</u> (AFTO 31-10-7)				
1. Are wrapped connections applied only on suitable terminals?				
2. Are connections essentially straight and free of angular bends or crimps?				

Figure 6-2. Sample of quality assurance inspection checklist--  
installation (sheet 7 of 11).

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QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 8 OF 11 PAGES		
		YES	NO	NA
3. Are the required number of turns in contact with the terminal in accordance with criteria for gauge of wire used?				
4. Are wrapped connectors soldered where applicable?				
P. <u>Cross Connections</u> (AFTO 31-10-11)				
1. Are jumpers properly routed at distribution frame?				
2. Do jumpers have sufficient slack after connection?				
3. Are conductors twisted between fanning strip and terminal?				
4. Does twist remain in conductors beyond rear of fanning strip?				
5. Are jumpers properly dressed?				
6. Has excess solder been removed from terminals?				
Q. <u>Equipment and Signal Grounds</u> (AFTO 31-10-24, 31-10-29)				
Are equipment and signal grounds installed in accordance with applicable codes and standards and in accordance with installation drawings?				
R. <u>Conduit</u> (AFTO 31-10-12)				
1. Are burrs removed from conduit after cutting?				
2. Is bending radii of conduit adequate?				
3. Are there more than four 90-degree bends in a single conduit run?				
4. Does number of conductors in conduit conform?				
5. Are conduits supported at intervals not exceeding 6 feet?				
6. Have all fittings been tightened after installation?				

Figure 6-2. Sample of quality assurance inspection checklist--  
installation (sheet 8 of 11).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 9 OF 11 PAGES		
		YES	NO	NA
S. <u>Ducts (RF Shieldings)</u> (AFTO 31-10-12, 31-10-13)				
1. Are hangers for overhead ducts mounted first?				
2. Is proper type mallet used in assembly?				
3. Are flange sections cleaned before installation?				
T. <u>Coaxial Cables</u> (AFTO 31-10-14)				
1. Is cable inspected for possible damage prior to installation?				
2. Where required, is cable sewed in same manner as signal cable?				
3. Is butting and stripping done in same manner as signal cable?				
4. Do cable tags remain on coaxial cable from antenna to RF patch or equipment?				
5. Is support spacing of cables installed as prescribed (3 ft for cable 1-5/8 in or smaller and 5 ft for cables 1-11/16 in or greater)?				
6. Does bending radii of cables meet prescribed standards of the T.O.?				
U. <u>Waveguides and Antennas</u> (AFTO 31R-10-5, CEEIA PAM 105-3)				
1. Are waveguides stored in a horizontal manner and away from heavy objects?				
2. Are waveguides inspected for possible damage prior to installation?				
3. Are waveguides cleaned in the proper manner prior to installation?				
4. Are hangers installed every 5 feet as prescribed?				
5. Do waveguide bends conform to T.O. criteria?				
6. Are antennas and reflectors mounted as prescribed heights?				
7. Are antennas oriented to the prescribed azimuth?				

Figure 6-2. Sample of quality assurance inspection checklist--  
installation (sheet 9 of 11).

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QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 10 OF 11 PAGES		
		YES	NO	NA
V. <u>Outside Plant Inspection</u> (AFTO 31R-10-5, 31-10-5, 31-10-3, 31-10-10, 31-10-21, 31-10-24, 31-10-28)				
1. Are antenna tower locations proper?				
2. Are footings or pads prepared prior to concrete pour?				
3. Have concrete pours for footings and pads been accomplished in accordance with specified criteria?				
4. Has proper cure time been achieved prior to mounting steel?				
5. Is the tower constructed in accordance with the specified criteria, drawings, etc?				
6. Are the antenna supports, anchors, pedestals, etc., properly installed in accordance with established criteria?				
7. Are supporting structures, guy wires, tower lighting kits (when required), termination boxes, and baluns included and properly installed in accordance with established criteria?				
8. Are antennas properly mounted and aligned?				
9. Were antenna reflectors properly aligned prior to mounting the feed horn?				
10. Are antenna curtains for rhombic and log periodics properly installed?				
11. Are transmission lines, coaxial cables, waveguides, etc., properly installed?				
12. Has tower and supporting structure been painted in accordance with established criteria?				
13. Are waveguides, cable runs, etc., properly installed and protected?				
W. <u>Power Buildings</u> (AFTO 31-10-3, 31-10-29)				
1. Are power buildings and pads properly located and installed?				

Figure 6-2. Sample of quality assurance inspection checklist-- installation (sheet 10 of 11).

QUALITY ASSURANCE INSPECTION CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 11 OF 11 PAGES		
		YES	NO	NA
2. Are generators and power distribution panels properly located and installed?				
3. Are oil pans properly installed?				
4. Are generators properly vented from the buildings?				
5. Has all required wiring been installed?				
6. Are fuel tanks installed above ground; if so, are they located at the proper distance from generator building?				
7. If fuel tanks were installed underground, was it accomplished in accordance with established procedures?				
8. Is safety equipment located in generator building?				
X. <u>Installation Drawings</u> (AFTO 31-10-29)				
Have drawings been reviewed to assure "as built" accuracy?				
TEST ENGINEER/QUALITY ASSURANCE REPRESENTATIVE (QAR)				

Figure 6-2. Sample of quality assurance inspection checklist--  
installation (sheet 11 of 11).

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Conduct acceptance tests in accordance with the provisions of section 7, the subsidiary documents specified therein, and CCCR 702-3 (para 6.2d) to determine the acceptability of the (applicable site) technical control facility, as installed. If the results of any portion of acceptance tests are not satisfactory, corrective action efforts are to be initiated through onsite engineering, installation and operational participants, and; in the absence of such representation, through channels. The QA representative/test director may retest to verify that corrective action efforts have been implemented and that the efforts will preclude recurrence. After satisfactory resolution he may subsequently resume acceptance tests. If these items can not be resolved by onsite personnel, the QA representative/test director will take either of the following actions: (1) reject the (applicable site) technical control facility and terminate testing until the matter is corrected or resolved, or (2) attempt to complete the acceptance tests noting the discrepancies, deficiencies, or shortcomings, as exceptions on the TAR (Form 98 in section 8). The participating agencies and organizations will be notified of these discrepancies, deficiencies, and shortcomings at the earliest practical date.

g. Record and analyze test results, determine acceptability of the installed (applicable site) technical control facility, record the data and findings on the TAR, and coordinate the data with the designated participants; prepare a final test report and make distribution in accordance with the guidance, direction, and format of CCCR 702-2 (para 6.2c). Project tasking documents must be consulted for modification of the distribution requirements. The acceptance test report will note outstanding installation and operational exceptions, and will recommend corrective actions to be taken by the responsible and participating agencies. The report will document project completion with correction of the exceptions being documented by correspondence or supplemental test reports as determined by the QA representative/test director or test agency, as appropriate.

6.2.3 Installation agency. In accordance with the provisions and authority of CCCR 702-4 (para 6.2d), the installation agency will establish and maintain a QC system. The QC system will assure that assessments of quality are conducted in accordance with the published procedures and that the results of the agency's QC inspections and follow-up actions are adequately recorded. USACEEIA Form 111-R (fig. 6-3) may be used for this purpose. The records are to be made available for review and evaluation by the test agency's test/QA representative director. The shakedown checkouts are to be satisfactorily completed and necessary corrections made prior to offering the (applicable site) technical

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR 702-2)		PAGE 1 OF 7 PAGES		
		DATE (Day, Mo, Year)		
SITE	LOCATION	QUALITY CONTROL REPRESENTATIVE (QCR)		
PROJECT NAME		TASK NO.		
A. <u>General Safety Practice</u>		YES	NO	NA
1. Are goggles being worn when using grinding machines?				
2. Are sharp edges left on frame or duct work?				
3. Are all hand tools properly used?				
4. Are electric power tools properly grounded?				
5. Are ground wires securely attached?				
B. <u>Floor Plan Layout</u>				
1. Are layout plans in accordance with drawings?				
2. Was layout plan completed before equipment was moved into area?				
C. <u>Erecting and Mounting</u>				
1. Is equipment laid out in accordance with floor plan drawing?				
2. Are equipment bays leveled and plumbed within tolerances?				
3. Has proper spacing been provided between equipment racks?				
4. Are base angles of frames secured to floor in proper location?				
5. Are all cabinets flush mounted and plumbed?				
6. Has finish of equipment, cabinets, and racks been touched up?				
7. Are bolts and screws free from stripped threads and defaced heads?				

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Figure 6-3. Sample of quality control checklist--installation  
(sheet 1 of 7).



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QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 2 OF 7 PAGES		
		YES	NO	NA
8. Have sufficient clearances been provided between apparatus for heat dissipation?				
9. Are terminal blocks aligned on distributing frames?				
10. Has equipment been installed in cabinets or racks in accordance with face layouts?				
11. Are all nuts and bolts securely tightened?				
12. Are exposed or cut ends of metal filed smooth and painted?				
D. <u>Cable Racks</u>				
1. Location of cable racks:				
a. Are cable racks located in accordance with cable plan drawing?				
b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?				
c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?				
d. Are cables located so they are not subject to damage due to exposure or other detrimental conditions?				
2. Assembly of cable racks:				
a. Are long sections of cable racks used where possible?				
b. Have clamping details been altered other than where necessary to avoid interference?				
c. Are open ends of cable racks properly closed?				
d. Are vertical cable racks properly terminated on floors?				
3. Support of cable racks:				
a. Are cable racks properly supported and fastened?				
b. Are cable racks installed so that no excessive load or bending is imposed on the equipment?				

Figure 6-3. Sample of quality control checklist--installation (sheet 2 of 7).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)	PAGE 3 OF 7 PAGES		
	YES	NO	NA
c. Are horizontal cable racks supported on approximately 5 feet centers but not to exceed 6 feet?			
d. Has support been provided within 3 feet of free end of cable rack?			
e. Are cable racks braced where necessary to prevent sway?			
<u>E. Running Cable</u>			
1. Are cable runs made in accordance with cable running list?			
2. Are oval shaped switchboard cables placed on edge?			
3. Are cables twisted or crossed on cable rack?			
4. Do cables conform to the bending radii and position at turns or bends?			
5. Is protection provided where cable sheaths contact rough or sharp edges or metal?			
6. Are cables turned off over side of cable racks formed with minimum allowable radii?			
7. Are cables turned off rack horizontally and then up?			
8. Do cables to the distributing frame enter on the vertical side?			
9. Are cables serving the horizontal side of a distributing frame secured to the transverse arms near the vertical upright?			
10. Are cable tags properly prepared and in accordance with the cable running list?			
11. Are cable tags secured at each end of cable run?			
12. Have cable tags been removed upon completion of verification and termination?			
13. Are cable butts located as near as practicable to the point where the first wires turn out?			
14. Are cable butts properly treated?			

Figure 6-3. Sample of quality control checklist--installation (sheet 3 of 7).

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QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 4 OF 7 PAGES		
		YES	NO	NA
15. Is insulation of wires undamaged at butt location?				
16. Are unused and spare wires protected at butt location?				
<b>F. Securing Cable</b>				
1. Is starting stitch properly made and placed?				
2. Is required Kansas City stitch properly made?				
3. Are first and succeeding layers of cable properly secured?				
4. Are cables secured at every cable rack cross strap?				
5. When cable butt is between securing devices, are cables secured together with an appropriate stitch?				
6. Are lock stitches properly made and spaced?				
7. Are splices in twine properly made?				
<b>G. Sewed Forms</b>				
1. Is proper size twine used for the diameter of the form?				
2. Are proper number of strands used?				
3. Are stitches properly spaced?				
<b>H. Butting and Stripping</b>				
1. Are proper tools used for butting and stripping of cable?				
2. Are cable butts properly dressed?				
3. Is proper distance maintained from cable butt to fanning strip?				
<b>I. Fanned Forms</b>				
1. Are cables fanned and connected to the left side of vertical mounted terminal blocks and to the bottom of horizontal terminal blocks?				
2. Are conductors in fanned forms not twisted and bunched?				

Figure 6-3. Sample of quality control checklist--installation (sheet 4 of 7).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 5 OF 7 PAGES		
		YES	NO	NA
3. Are fanned forms straight and taut from butt location to fanning strip?				
4. Is length of skimmers correct?				
5. Has color code been properly followed?				
6. Are spare wires disposed of properly?				
J. <u>Stenciling</u>				
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?				
2. Are designations correctly located?				
3. Are corrected size designations used on particular types of apparatus or equipment?				
K. <u>Strapping</u>				
1. Are straps properly placed?				
2. Is correct type of strap wire used?				
3. Does insulation extend to terminal?				
4. Are straps placed so as to not interfere with operation of apparatus?				
5. Is removal of apparatus not blocked?				
6. Are designations not obscured?				
L. <u>Connecting and Soldering</u>				
1. Is soldering clamp used when connecting wires?				
2. Are connections made on terminal in proper manner?				
3. Is all soldering done with standard resin core solder?				
4. Are connections secure and free of foreign substances?				
5. Have all unsightly flux and excess globules of solder been removed?				
6. Is insulation on skimmers not burnt or otherwise damaged?				

Figure 6-3. Sample of quality control checklist--installation (sheet 5 of 7).

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QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 6 OF 7 PAGES		
		YES	NO	NA
7. Do skinners on connected terminals not exceed 1/16 in?				
8. Are all conductors given a continuity test after connection is made?				
<b>M. <u>Transistor Soldering Techniques</u></b>				
1. Is caution exercised to assure that excessive heat does not destroy transistors?				
2. Are safeguards in effect to prevent leakage current at the end of an electrical soldering iron from destroying transistors?				
<b>N. <u>Wrapped Connections</u></b>				
1. Are wrapped connections applied only on suitable terminals?				
2. Are connections essentially straight and free of angular bends or cramps?				
3. Are the required number of turns in contact with the terminal in accordance with criteria for gauge of wire used?				
4. Are wrapped connectors soldered where applicable?				
<b>O. <u>Cross Connections</u></b>				
1. Are jumpers properly routed at distribution frame?				
2. Do jumpers have sufficient slack after connection?				
3. Are conductors not twisted between fanning strip and terminal?				
4. Does twist remain in conductors beyond rear of fanning strip?				
5. Are jumpers properly dressed?				
6. Has excess solder been removed from terminals?				

Figure 6-3. Sample of quality control checklist--installation (sheet 6 of 7).

QUALITY CONTROL CHECKLIST - INSTALLATION (CCCR-702-2)		PAGE 7 OF 7 PAGES		
		YES	NO	NA
<p>P. <u>Equipment and Signal Grounds</u></p> <p>Are equipment and signal ground installed in accordance with applicable codes and standards and in accordance with installation drawings?</p>				
<p>Q. <u>Conduit</u></p> <p>1. Are burrs removed from conduit after cutting?</p> <p>2. Is bending radius in accordance with AFTO 31-10-12?</p> <p>3. Are there no more than four 90 degree bends in a single conduit run?</p> <p>4. Does number of conductors in conduit conform to AFTO 31-10-12?</p> <p>5. Are conduits supported at proper intervals?</p> <p>6. Have all fittings been tightened after installation?</p>				
<p>R. <u>Ducts (RF Shieldings)</u></p> <p>1. Are hangers for overhead ducts mounted first?</p> <p>2. Is proper type mallet used in assembly?</p> <p>3. Are flange sections cleaned before installation?</p>				
<p>S. <u>Coaxial Cables</u></p> <p>Is cable inspected for possible damage prior to installation?</p>				

Figure 6-3. Sample of quality control checklist--installation (sheet 7 of 7).

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control facility for acceptance testing. The installation activities QC system must meet all procedures contained in USACEI-Bn Pam 105-3 (para 6.2h) or in SAAD On-Site QC Inspection Plan (para 6.2i), as appropriate. The installation agency will designate a quality control representative, who will assure that the following actions are expeditiously performed as follows:

a. Assure that QC procedures are effectively applied on this installation and establish the reporting requirements consistent with this project, the EIP, and all policies. Assure that the corrective action efforts related to the installation are resolved and corrected at the earliest possible point in the installation effort.

b. Assure the availability of test equipment for shakedown in conjunction with participating elements and checkout and acceptance testing. Reliance is to be placed upon the operating agency to supply test equipment when it is common to operations and maintenance functions.

c. Assure that shakedown is accomplished as specified and any corrective action is completed prior to acceptance testing.

d. Advise the QA representative/test director of the anticipated completion date at the earliest time. This notice should be given not less than 15 days prior to the scheduled completion to permit efficient and expeditious transportation of test personnel and equipment.

e. Assure that two installation personnel remain onsite to assist in the final QA inspection and acceptance testing.

f. Assure the QC inspection records and installation documentation are maintained onsite and readily available to the QA representative/test director. When the onsite effort is completed, the QC documentation shall be placed in the project files and maintained for 1 year.

**6.2.4 Operating agency.** The operating agency will be the site or location cognizant organization element and will be so identified in all project documentation and individual EIP's. Tasking to support the USACEIA QA and acceptance test effort will be accomplished through command channels. The operating agency will designate a representative early in the project but no later than the start of installation. He will assure that the following actions are taken and expeditiously completed:

- a. Provide administrative and typing support.
- b. Serve as interface between the installation, quality assurance and test personnel, and the operating agency.
- c. Assist in resolution of discrepancies, deficiencies, and shortcomings.
- d. Make operating and maintenance personnel available to assist on an as-required basis.
- e. Provide a representative to witness the acceptance test and sign the TAR.

### 6.3 SPECIAL CONSIDERATIONS.

6.3.1 Interruptions. QA inspections and tests may be interrupted at any point if disrupted by an equipment or system malfunction. They may also be interrupted at a compatible breaking point to permit scheduled duty breaks. Any inspection that is interrupted because of equipment malfunction shall be restarted at a point determined appropriate by the QA representative/test director.

6.3.2 Substitutions. Spare equipment may be substituted for malfunctioning equipment with the approval of the QA representative/test director. Any equipment which has been replaced shall be repaired and retested. During acceptance tests, any piece of equipment, including cables, conduit, etc., may not be changed or adjusted without the approval of the QA representative/test director.

6.3.3 Corrections or modifications of documentation. Site plans, specifications, EIP's, drawings, etc., are to be acquired by quality assurance, quality control, and test personnel prior to commencement of the specified work effort. At this time the QA representative/test director will have identified the applicable and nonapplicable observation items on USACEEIA Form 112-R and will delete and mark nonapplicable (N/A) those items inappropriate for his QA inspection observation items. These documents shall be used as master documents to mark, record, and identify discrepancies. Any discrepancies noted shall be recorded using yellow markings to record deletions of equipment or cables and changes in schematic diagrams. All additions shall be noted with red markings. Notes to the draftsman will be in blue. Site documentation will be marked in the same manner. The designated installation agency representative will deliver a copy of the markedup drawings to the onsite USACEEIA installation engineering element and in the absence of an engineer deliver to Commander, USACEEIA,



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ATTN: CCC-CED, Fort Huachuca, Arizona 85613 or as amended by the EIP. In all cases a complete set of marked drawings will be left onsite for, and maintained by, the operating agency.

## SECTION 7. OPERATIONAL TEST PLAN AND CHECKOUT PROCEDURES

7.1 GENERAL. This section contains the test procedures and states the special conditions which apply to shakedown and checkout and acceptance tests for the installed (applicable site) technical control facility. Onsite tests are performed to determine if the designated (applicable site) technical control facility has been installed correctly, performs in accordance with the technical requirements of this EIP and subsidiary documents, and is operationally suitable for the intended application.

### 7.2 TESTING.

7.2.1 Shakedown test and checkout. Functional tests will be conducted by the installation agency for the purpose of assuring that the equipment is aligned and operable, and the installation is in accordance with the engineering documentation. These tests and checkouts will be conducted in coordination with personnel of the operating agency using the test plan identified in 7.2.2 and applicable technical bulletins and technical manuals available to the operating agency (the user). These tests will be conducted prior to the installation agency offering the installation for acceptance tests. As stated in section 6, the installation agency is to anticipate the installation completion date and notify the test agency of this completion not less than 15 days of scheduled date.

7.2.2 Onsite acceptance tests. Onsite acceptance testing will be accomplished in accordance with CCC-TED-73-TP-87. These tests will be preceded by a thorough QA inspection in accordance with the requirements of section 6. Tests will be conducted in a normal operating environment. Abnormal ambient conditions (e.g., temperature, humidity, or barometric pressure) during any test will be noted in the test log with detailed remarks included with the test results. The test director will determine if any retesting is required. The operating agency will provide personnel to operate and maintain the equipment during tests. The installation agency will provide personnel to assist the test director in the conduct of tests and measurements.

7.2.3 Test equipment. A complete listing of the required test equipment is contained in CCC-TED-73-TP-87. Although the installation agency is responsible for assuring that requisite complement of test equipment is available for installation, inspection, and test purposes; this test equipment should be available onsite from the operating agency.

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7.2.4 Test results. When one or more tests fail to meet requirements, the test director will determine which portions of the test was affected and which portions of the equipment or facility is to be retested. All deficiencies will be corrected, or, if not corrected, the deficiencies will be reported in a TAR and test report.

7.2.5 Technical acceptance recommendation. Based on the QA inspections, QC reports, and documentation and acceptance test results, the test director will determine the acceptability of the work effort. Before actual rejection, if the circumstances so warrant, the test director will attempt to coordinate his determination with the test agency and other cognizance agencies, as appropriate. The test director will prepare and distribute the TAR in accordance with the requirements of section 8. Preparation of the TAR will be accomplished onsite immediately following acceptance tests.

7.2.6 Test report. The test agency will prepare and distribute a test report in accordance with CCCR 702-2 (para 6.2b) as amended by the individual EIP and tasking documents. Copies of the completed TAR and Quality Assurance Inspection Checklist-Installation (FM 112-R) will be included.

## SECTION 8. COMPLETION CERTIFICATION

8.1 GENERAL. The results of the quality assurance inspections and acceptance tests specified in sections 6 and 7 will be documented onsite by the quality assurance representative/test director using USACEEIA Form 98, Technical Acceptance Recommendation (fig. 8-1). The purpose of this technical document is to record the significant project information to include the scope of the effort, results and conclusions of the requisitic inspections and tests, exceptions to the technical requirements, and recommendations regarding acceptance with or without exceptions or rejection of the work effort. The TAR also provides for other participants to indicate agreement or disagreement with the inspection and test assessments, and for the user to state a willingness to technically accept the installed (applicable site) technical control facility.

8.2 DISTRIBUTION. A copy of the TAR will be provided to the signing participants and the operating agency. The original copy will be maintained in the test agency project files, but copies will be reproduced and included as a part of the test report.

8.3 WAIVERS. Waivers to include command approvals for individual installations will be recorded in the TAR and copies attached for the purpose of clarifying deviations from this SEIP.

### 8.4 INSTRUCTIONS.

8.4.1 Technical acceptance recommendation. Entries on the data sheets are to be typed whenever possible. If a typewriter is not available, the forms may be completed by printing with black ink in block letters to provide a quality, fully legible product when reproduced. The instructions for completion of this form follow on a block-by-block basis.

8.4.2 Page identification. Pages are to be sequentially numbered to show both the individual page number and the total number of pages constituting the completed TAR. Additionally, each page will be identified by the date and project/contract number in the appropriate blocks.

8.4.3 Completion instructions. Instructions for completion of the TAR are outlined in the following subparagraphs and will be completed in accordance with these instructions:

a. Date (block 1): Enter the day, month, and year of completion for this action (e.g., 1/1/79 as the first day of the first month of 1979).

b. Project/contract number (block 2): Enter the appropriate project or contract number. If this is a subproject or part of a subproject, provide all necessary information (i.e., IIP milestone numbers, subproject numbers as well as subdivisions to same).

c. Title (block 3): Enter the project name or title.

d. Location (block 4): Enter the geographic location where the project was installed.

e. Facility (block 5): Enter the name of the facility and other pertinent identifying information.

f. Test director (block 6): Enter the name, title, and grade of the test director or QA representative assigned to this project.

g. Operating agency (block 7): Enter the name, symbol, and complete mailing address of the organization having operations and maintenance responsibility for this project, system, or equipment installation.

h. Engineering agency (block 8): Enter the name, symbol, and complete mailing address of the organization having engineering cognizance and responsibility.

i. Installation agency (block 9): Enter the name, symbol, and complete mailing address of the organization having been tasked to install the TAR materiel.

j. Testing agency (block 10): Enter the name, symbol, and complete mailing address of the quality assurance and testing organization tasked for this project.

k. Project description (block 11): Enter a brief and concise description of the project to which the TAR applies.

l. Major equipment installed/relocated (block 12): List the major items of equipment installed or relocated in accordance with the project requirements. Enter the BOM line item number, material description, assigned part number or federal stock number, and the quantity of each major item. Components, assemblies, and sub-assemblies configured into a major item as listed in SB 700-20 should also be recorded. Additional pages, numbered in sequence, may be added as required.

m. Documentation (block 13): Enter the document identification (i.e., drawing number, technical manual number, etc.), title, and the quantity of each document provided to the operating unit as part of the project.

n. Exceptions (block 14):

(1) Upon completion of installation and testing, any exceptions to the project requirements, which require corrective action, will be listed. Include complete identification of each missing item. Exceptions must be based on the specified requirements of the project, supportable through the test results or other valid documentation, fully described, and precisely identified.

(2) The appropriate exception block must be annotated and separate sheets should be used for each category of exception.

(3) The test director will also enter the suggested action agency for each exception, recognizing that the test director may not always be in a position to determine the final action agency.

(4) For facilities that are becoming partially operational, identify installation agency actions remaining for project completion. In this situation, the TAR will show the tests that have been made, but will be identified as a partial record. A final TAR will be prepared after installation and testing of all remaining project equipment.

o. Remarks (block 15): The remarks section may be used to provide any additional information on or in support of a recommendation, commendation, or criticism in relation to the project installation, engineering, or testing. Entries may include the following:

(1) Shortcomings which do not require corrective action (not considered an exception).

(2) Recommendations for improving projects of a similar nature.

(3) Identification of support items that have not been accomplished and a description of any activity in progress by the operating agency to satisfy the requirement.

(4) A description of test results with the performing agency and dates accomplished.

(5) A statement to the effect that the installation agency will forward final as-built drawings when completed.

(6) A description of the ac power system with identification of source and backup capability.

(7) A statement to indicate that a list of excess material was provided the operating command for final disposition or to identify material that was excess to the project.

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p. Certification (block 16): Enter the signatures and certification that the project was installed, tested, and accepted for operation with or without exceptions as applicable.





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TECHNICAL ACCEPTANCE RECOMMENDATION (INSTALLED EQUIPMENT) (CCCR 702-2)		PAGE      OF      PAGES	
		DATE (DAY, MO, YEAR)	
PROJECT/CONTRACT NUMBER	TITLE	LOCATION	
MAJOR EQUIPMENT INSTALLED/RELOCATED			
BOM ITEM NO.	DESCRIPTION	PART NUMBER/FSN	QUANTITY

Figure 8-1. Sample of technical acceptance recommendation  
(sheet 2 of 6).

1 October 1979

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TECHNICAL ACCEPTANCE RECOMMENDATION (DOCUMENTATION) (CCCR 7G2-2)		PAGE            OF            PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
PROJECT DOCUMENTATION PROVIDED		
REFERENCE DOCUMENTATION	TITLE	NO. OF COPIES

Figure 8-1. Sample of technical acceptance recommendation  
(sheet 3 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (EXCEPTIONS) (CCCR 702-2)		PAGE	OF	PAGES
		DATE (DAY, MO, YEAR)		
PROJECT/CONTRACT NUMBER	TITLE	LOCATION		
EXCEPTIONS ENGINEERING <input type="checkbox"/> INSTALLATION <input type="checkbox"/> OTHER <input type="checkbox"/>		SUGGESTED ACTION AGENCY		

Figure 8-1. Sample of technical acceptance recommendation  
(sheet 4 of 6).

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[illegible]

Figure 8-1. Sample of technical acceptance recommendation  
(sheet 5 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (CERTIFICATION)		PAGE      OF      PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
<p align="center"><b>CERTIFICATION</b></p> <p>Acceptance tests and Quality Assurance Inspections are complete for equipment installed under this project.</p>		
WITHOUT EXCEPTIONS <input type="checkbox"/> WITH NOTED EXCEPTIONS <input type="checkbox"/>		
INSTALLATION AGENCY	SIGNATURE AND TITLE	
	PRINTED	
OPERATING AGENCY	SIGNATURE AND TITLE	
	PRINTED	
TEST AGENCY	SIGNATURE AND TITLE	
	PRINTED	
<p align="center"><b>ACCEPTANCE</b></p> <p>Equipment herein certified successfully installed and tested, is accepted for operation.</p>		
OPERATING COMMAND	SIGNATURE	
	TITLE	

Figure 8-1. Sample of technical acceptance recommendation  
(sheet 6 of 6).

1 October 1979

SEIP 006

(CCC-CED)

FOR THE COMMANDER:

OFFICIAL:

R. K. BOWERS  
Colonel, Signal Corps  
Deputy Commander

*Merton M. K. Chun*

MERTON M. K. CHUN  
Lieutenant Colonel, Signal Corps  
Executive Officer

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- 2 - Air Force Communications Service, ATTN: 1842 EEG/EEM, Scott AFB, IL 62225
- 2 - Naval Electronic Systems Command (NAVELEX), Code 51032, Washington, DC 20315
- 4 - 1st Signal Brigade, USACC-Korea, ATTN: CCK-OPS, APO SFRAN 96218
- 1 - USACC Agency-Japan, ATTN: CCJ-OPS, APO SFRAN 96343
- 2 - USACEEIA Installation Detachment-Korea, ATTN: CCK-IN, CCK-QA, APO San Francisco 96301
- 3 - USACSA, ATTN: CCM-SW-C, Fort Monmouth, NJ 07703

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Fort Huachuca, Arizona 85613

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Fort Huachuca, Arizona 85613

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Comments on SEIP \_\_\_\_ (please give number)

SEIP MGT Officer  
AUTOVON 879-6719

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How can we contact you?

Rank	Name	Duty position	Duty station	AUTOVON number
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Rank	Name	Duty position	Duty station	AUTOVON number
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ENGINEERING INSTALLATION AGENCY  
Fort Huachuca, Arizona 85613

Change  
No. 1

31 March 1981

STANDARD  
ENGINEERING INSTALLATION PACKAGE  
TECHNICAL CONTROL FACILITY

USACEIA SEIP 006, 1 October 1979, is changed as follows:

1. Insert new pages 3-20 and 3-21 after Section 3.
2. After posting the change, file this change sheet in front of the basic publication for reference purposes.

(CCC-CED)

FOR THE COMMANDER:

OFFICIAL:

R.K. BOWERS  
Colonel, Signal Corps  
Deputy Commander

*Merton M. K. Chun, MA5*  
MERTON M. K. CHUN  
Lieutenant Colonel, Signal Corps  
Executive Officer

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31 March 1981

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- 2 - USACEEIA Installation Detachment-Korea, ATTN: CCCK-IN, CCCK-QA, APO San Francisco 96301
- 3 - USACSA, ATTN: CCM-SW-C, Fort Monmouth, NJ 07703

31 March 1981

C1, SFIP 006

3.6 SHRINK TUBING. 3/16", black, shrink tubing will be used on the 80/100 pin connectors. The shrink tubing will be 1" long, with 1/4" of the tubing covering the solder joint and 3/4" of the tubing covering the insulation of the conductor.

3.7 GROUNDING OF PATCH PANELS. Grounding of the patch panels inside the cabinets (protective ground) will be accomplished in accordance with figure 3-5.

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C1

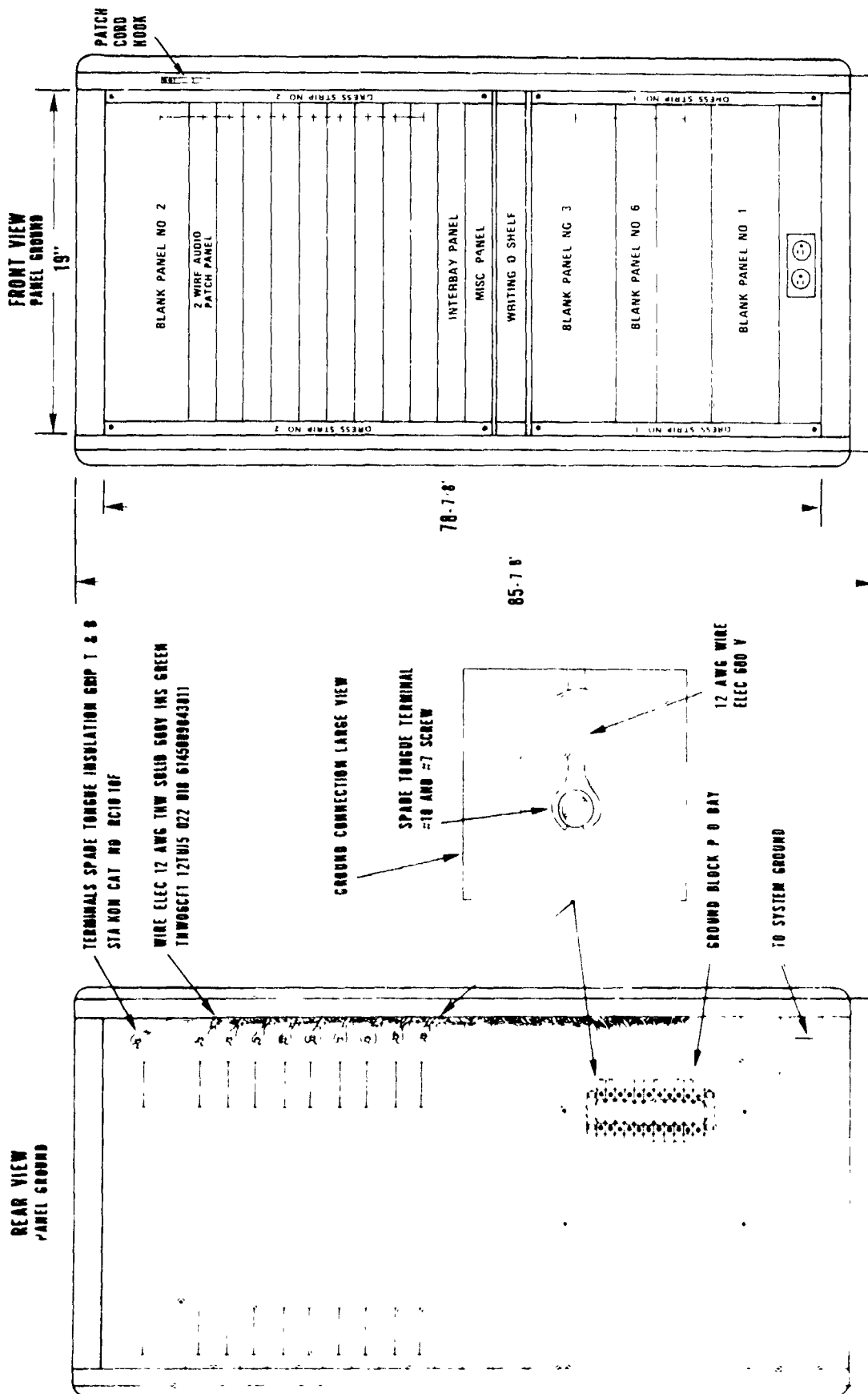


FIGURE 3-5 PATCH PANEL GROUNDING DETAIL

END

DATE  
FILMED

6-48-1

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ENGINEERING INSTALLATION AGENCY  
Fort Huachuca, Arizona 85613

Change  
No. 2

29 July 1983

STANDARD  
ENGINEERING INSTALLATION PACKAGE  
TECHNICAL CONTROL FACILITY

USACEEIA SEIP 006, 1 October 1979, is changed as follows:

1. Make the following pen and ink changes:

Section 4, pages 1 and 2, change the drawing numbers as follows:

OLD NUMBERS

COM-TC03-103  
COM-TC03-104  
COM-TC03-105  
COM-TC03-106  
COM-TC03-108  
COM-TC03-109  
COM-TC03-110  
COM-TC03-111  
COM-TC03-112  
COM-TC03-113  
COM-TC03-114  
COM-TC03-115

NEW NUMBERS


COM-TC-0071 (1 sheet)  
COM-TC-0072 (6 sheets)  
COM-TC-0073 (3 sheets)  
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